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HOWARD CAMPBELL, Editor

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CONTENTS

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MODERN Machine Shop

CINCINNATI, OHIO

NOVEMBER, 1936 VOL. 9, NO. 6

Special Tools Expedite Work at Frisco-Memphis Shops

Included in this article are descriptions and illustrations of a number of unusual tools and machines.

BY HOWARD CAMPBELL

THE standard machine shop equipment of the Memphis Shops of the St. Louis & San Francisco Railway has been augmented by the addition of a number of special tools, designed and developed by various members of the shop organization, which have simplified otherwise difficult jobs, reduced the machining time on others, and raised the efficiency of the mechanical department as a whole. Through the courtesy of the railroad management some of these tools are presented herewith.

The job shown in Fig. 1 is a simple but effective setup for boring out engine truck brasses. The brass is held in a fixture which, in turn, is clamped to the bed of a horizontal boring machine. The fixture is of the welded variety, being made from heavy steel plate. Hardened steel teeth are set into the extension wings at either end of the fixture, to provide means for positively clamping the work in the fixture which is done by the use of

Fig. 1—Boring Engine Truck Brasses.

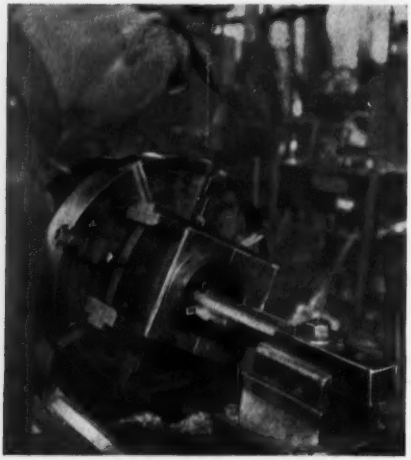

Fig. 2—The front side rod brasses are bored out in the lathe, using a special fixture.

clamps that are tapered to fit into the teeth at one end and sharpened to grip the work at the other.

The machining is done with a fly cutter, held in a bar that is located in the headstock and tailstock of the machine in the usual manner. While this equipment seems at first glance to be large for the operation, the task of clamping, machining and unclamping the work is very simple and the sturdiness of the machine promotes a high degree of accuracy. All sizes of engine truck brasses from the 5-in. car brass to the largest in use are machined with this equipment.

The equipment for boring front side rod brasses is shown in Fig. 2. This operation is performed on a lathe, a special fixture being used in which the work can be instantly located and quickly clamped.

Before this fixture was designed, it was necessary to chuck the work in the lathe chuck itself, which required a certain amount of adjustment of the jaws in order to locate the piece properly. With the fixture shown, the work is located properly by simply slipping it into position in the fixture. The clamp is a separate piece, the ends of which fit into slots in the sides of the fixture. The work is located in position by tightening the setscrew in the center of the clamp, which also holds the clamp firmly in position. Loosening the screw allows for removal of the clamp and the work is easily removed from the chuck.

Figure 3 shows an internal grinding machine in use for trueing up a bushing in a triple valve. While this is a standard machine, this operation is included here because of the ease and speed with which worn, out-of-round, and tapered valves can be trued up.

Usually the removal of from 0.003 to 0.004 in. is sufficient to true up the hole and while approximately 15 minutes time is required to set up for the first piece, following pieces can be trued up in seven or eight minutes apiece.

The equipment for drilling and countersinking floating rod bushings is shown in Figs. 4 and 5. This jig consists primarily of a leaf hinged to

Fig. 3—Using an internal grinding machine to true up a bushing in a triple valve.

a base and carrying a spindle upon which the work is located. To center the work properly, the spindle carries two tapered flanges or centers, the one nearest the hinged leaf being stationary while the other is reamed to fit the spindle and is removable. Thus with the spindle in the vertical position, as shown in Fig. 4, the bushing is placed in position on the lower end and the upper center is slipped into the upper end of the bushing, a screw clamp on the end of the spindle serving to hold the upper center end bushing in position. With the bushing located in place on the spindle, the spindle is swung to the horizontal position as shown in Fig. 5.

As can be seen from this illustration, the spindle also carries an indexing plate, a spring pin in the hinged leaf providing for locating the workpiece in the desired position. Six different arrangements of holes can be drilled with the four rows of holes in the indexing plate, the arrangement of the plate being as follows; 24, 20, 16 and 12 holes to a circle. This fixture not only simplifies the locating and holding of the work for machining; it also eliminates the task of laying out the brass for drilling—which is more important.

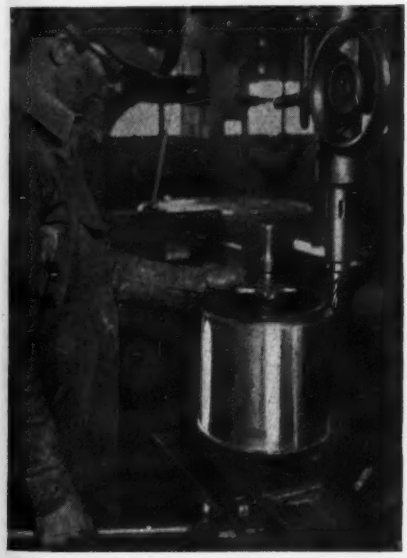

Fig. 4—Floating rod bushings are drilled and countersunk in this fixture, which is swung to horizontal position when the piece is properly clamped.

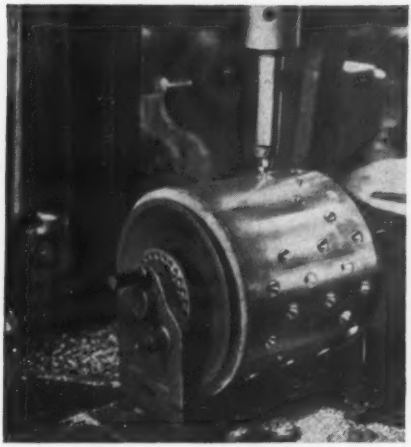

Fig. 5—Drilling and countersinking a floating rod bushing. Six different arrangements of holes can be drilled with this fixture.

New rings in pump governor steam bodies, which were formerly lapped-in by hand, are now lapped-in by air from the shop air line. The body is located in place on the equipment shown in Fig. 6, a ½-in. cut-out cock providing for entrance of the air. As the valve is opened and closed by operation of the lever, the air pressure raises the steam piston and a spring pushes it down. This operation, which usually took about 25 minutes when the rings were lapped-in on the bench, takes from three to five minutes with the equipment shown.

Holes for knuckle pin bushings in front couplers are bored on a milling machine as shown in Fig. 7. The work is easily clamped in position on the milling machine table, and the boring operation is performed with a boring

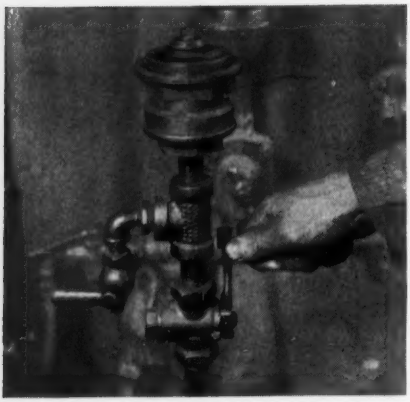

Fig. 6—Device for lapping-in new rings in pump governor steam bodies.

bar that has a taper shank at one end to fit into the spindle of the machine and which is at the other end.

The cutting is done with a ⅜-in. toolbit and two cuts are taken to obtain the necessary accuracy. The holes are bored to a 1/64-in. press fit and are bushed with steel bushings, which makes a very satisfactory job.

Side rods and main rods on Frisco passenger engines are polished by the use of a Chicago Pneumatic air motor and a "Quick-As-Wink" buffing wheel as shown in Fig. 8. Aloxite No. 1½ emery cloth is used on the wheel, producing a very smooth, bright finish. Polishing the side and main rods in this manner not only improves the appearance of the locomotives but also adds to the safety factor as it is much easier for an inspector to locate defects in a highly polished rod than in one which is not polished.

One of the most economical pieces of equipment in the plant is the Cincinnati steel press brake shown in Fig. 9. By using simple fixtures, this machine is used to bend and form car center braces, bolster diaphragms,

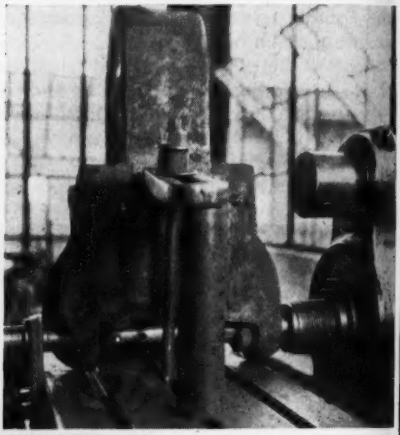

Fig. 7 (Above)—Boring holes in front couplers for knuckle pin bushings.

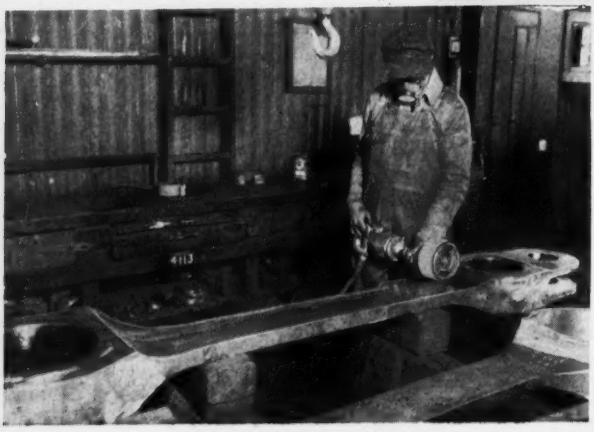

Fig. 8 (Left)—Side and main rods on "Frisco" engines are polished, not only for appearance, but also as a safety factor.

cross barrier diaphragms, and other parts including V bars and angles of all shapes and sizes. The saving on car

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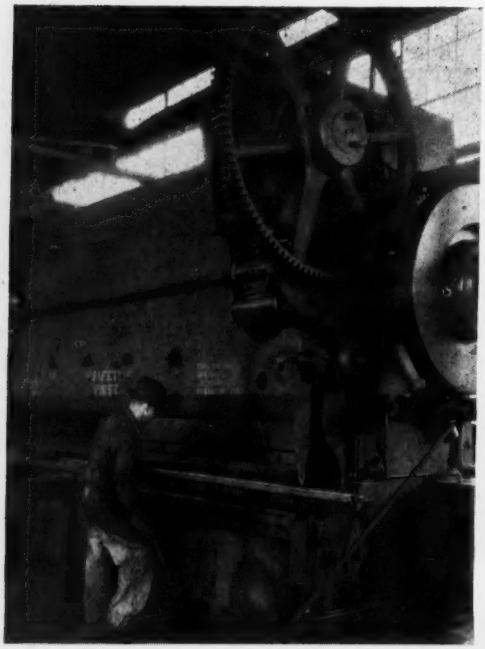

Fig. 9—All kinds of V-bars, angles, center braces, and other parts used in car construction are bent and formed with this Cincinnati steel press brake.

work alone has, according to the car department foreman, made this machine a good investment.

Another piece of modern plant equipment is the Williams and White 25-ton electrically driven hydraulic press illustrated in Fig. 10. In the illustration the machine is shown set up for straightening a bulb angle, but it is also used for straightening end shells, stakes, spring panels, channel iron, side frames, and other parts that formerly were straightened only by heating in the forge. This press has eliminated the necessity for heating the steel, thus making it possible to retain in the steel the qualities of strength and toughness for which it was selected. Elimination of the necessity for heating has also eliminated a considerable amount of handling and processing time.

Another time-saving operation, not illustrated, is that of building up the side frame fits on tank truck bolsters, which is done by welding in a ¼-in. steel plate to bring the fit back to the original size. The side frame fit is,

(*Continued on Page 66*)

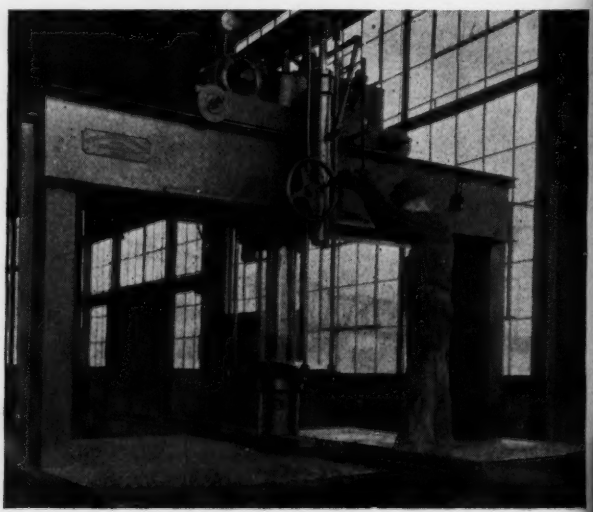

Fig. 10—Channel irons, side frames, and other parts that formerly were straightened by heating in the forge are now worked cold with this 25-ton hydraulic press.

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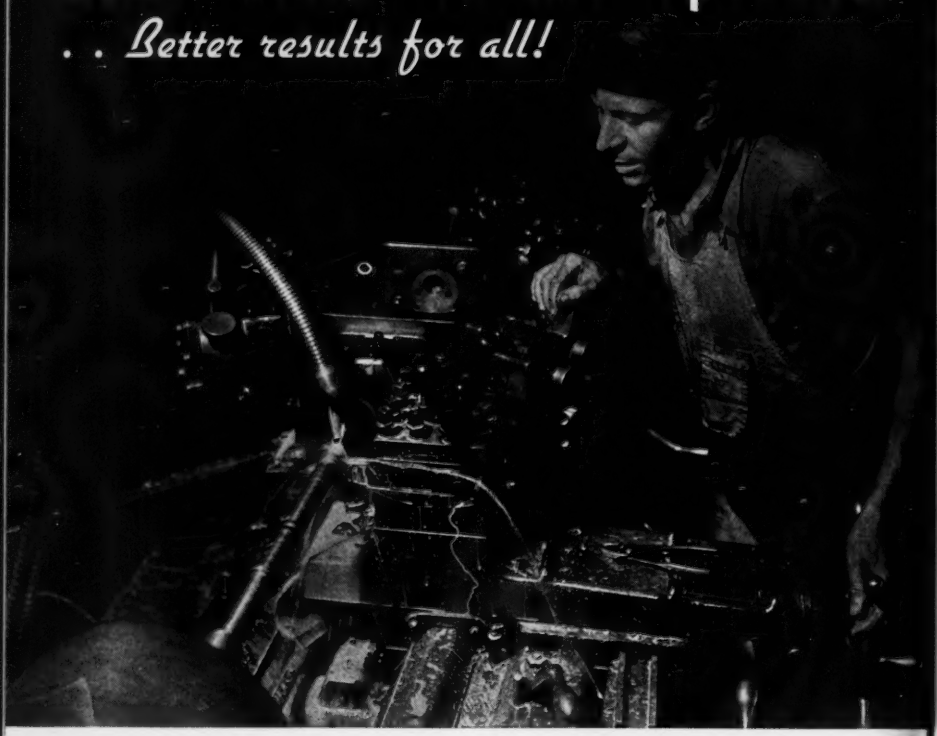

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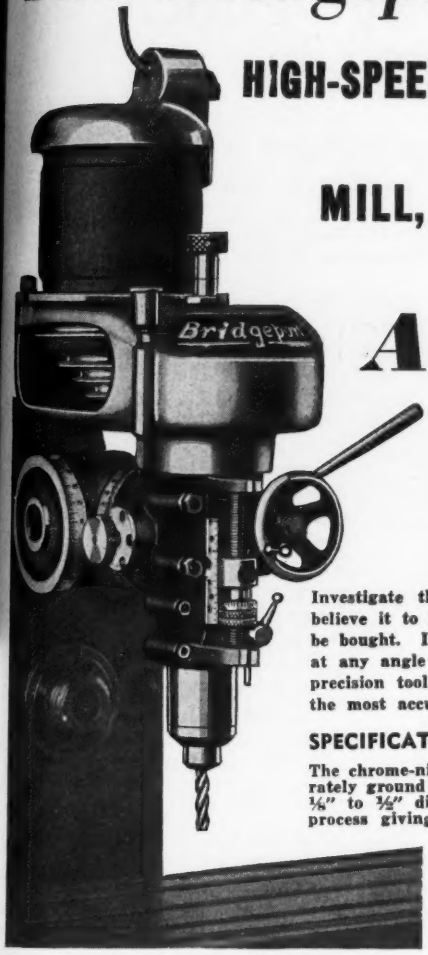

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"Low Activity" Punch Press Tools

In this article the author explains the design of cutting dies and forming tools for small order jobs.

By C. L. Szalanczy,
Tools & Equipment Department, Westinghouse Electric & Mfg. Co.

THE general plant equipment in most manufacturing plants is overhauled periodically, at which time the necessary repairs are made and worn and broken parts are replaced with new ones. The necessity for new parts for replacement purposes usually means that the various equipment manufacturers continue to receive straggling orders for service parts long after the original tools have been worn out or misplaced. However, they are under obligation to furnish repair parts for their product; thus they are faced with the problem of producing these parts at a cost which will be commensurate with the small demand.

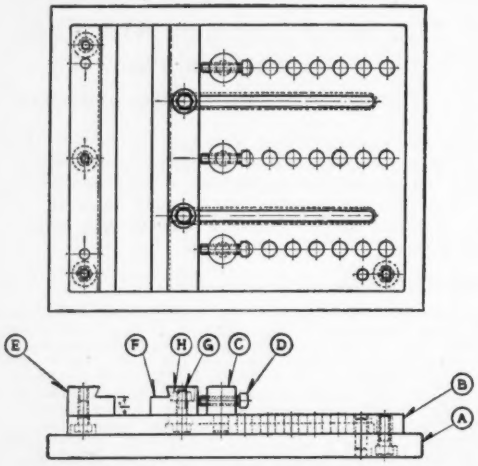

Fig. 1—Die shoe for "low activity" press tools.

In many cases the parts required are metal stampings that were produced with tools which cost hundreds of dollars. If these tools are no longer available, the supplier is put to the necessity of either making up an expensive set of press tools or of finding some way to produce the parts in a more economical manner. In many cases time is an important factor and the building of a duplicate of tools would take perhaps from one to several weeks.

Careful study has been given to the matter of bringing the cost of manufacturing service parts down to a point where it will pay the customer to buy replacement parts rather than to replace his entire equipment. Obviously, cheaper tools must be devised, while at the same time exactness and high grade workmanship must be maintained. The type of temporary die which is made with loose punches which drop through the die at each operation of the press is beyond consideration when the press operators are working on standard set time. In the case which the writer is presenting for discussion it was finally decided to dispense with individual die sets

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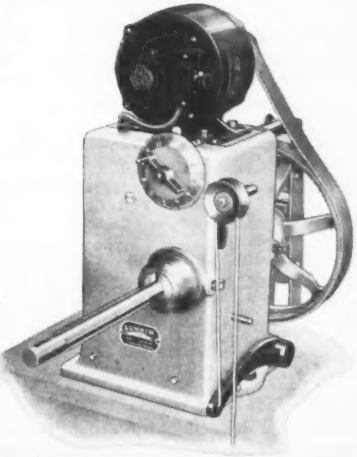

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and two die shoes were designed and built—one for dies of the cutting and blanking types and one for the benders and forming dies. The shoes were made adjustable, so that they could accommodate both small and large dies as required.

The blanking die shoe is illustrated in Fig. 1. In the analysis of the job

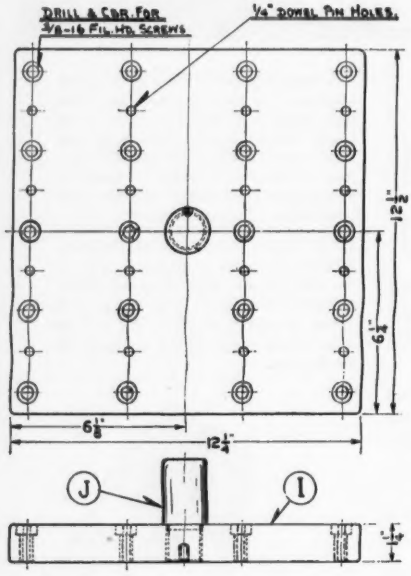

Fig. 2—Punch holder for the die shoe illustrated in Fig. 1.

it was found that the blanking type of dies ran to as much as 14 inches in length and varied in width from 3½ to 12½ inches. The die shoe illustrated will, however, take care of any dies within these dimensional boundaries.

Item **A** is the mounting plate on which the shoe is assembled, and is made of 1¼-in. hot rolled steel. It is burned out to size from stock plate. The plate is 16 in. wide and 20 in. long, is slab ground on the top and bottom to assure perfect setting on the bolster plate of the punch press, and is rough machined on all four sides.

The die shoe **B** is of 1-in. hot rolled steel, 14 in. wide by 18 in. long. When mounted on the lower plate, a 1-in. clamping ledge on all four sides provides for fastening. Since usually the die shoe is clamped down on the press from the sides, having clamping ledges all around permits the die shoe to be set or turned on the press in the manner best suited for the job and the die. The plate **B** is ground on the top and bottom surfaces and has two "T" slots machined lengthwise in it. These slots are made to suit the head of a ½-in. 13-thd. hex. head bolt. The upper part of the "T" slot is made 9/16 in. across so it clears the bolt. It may be noted on the illustration that there are three rows of ¾-in. holes drilled into this plate on 1¼-in. centers and the rows are 4¾ in. apart.

The stud **C** is made of 1¼-in. cold rolled steel, the bottom being turned down to a slip fit in the ¾-in. holes in the die shoe. The upper part of the stud is drilled and tapped so that the ½-in. 13-thd. square headed set screw **D** may be inserted.

The stationary jaw **E** and the movable jaw **F** are both of cold rolled steel, and each jaw has a 15 degree dove tail machined into it on the inner side. The dove tail is ½ in. deep, with a 15/16-in. horizontal seat on which the die is placed. The stationary jaw is permanently fastened to the die shoe with three ½ in. 13thd. hex. headed bolts and kept in alignment with two ½-in. hardened dowels.

The movable jaw **F** is mounted in place and is fastened down with two ½-in. 13-thd. hex.-headed bolts **G** in the T-slots of the die shoe. The jaw is counterbored to allow the lock nut **H** to set below the top surface of the jaw so as to be out of the way. The die shoe is fastened on the mounting

plate with six ½-in. 13-thd. hex. head bolts and two ½-in. dowels.

The die, having the same 15-degree angles machined on two sides, is placed between the jaws. The movable jaw F is forced up in place with the three set screws, then the lock nuts are fastened and the die is ready for operation.

It may be noted that there is a 1-in. opening between the bottom of the die and the top of the die shoe. The cut blanks and the scrap slugs from the piercing operation both fall into this opening and the punch press operator must keep the blanks pushed out to prevent them from building up under the die and causing damage to the blanking tool.

A special set of punch holders were also made that takes in all the different sizes of punch plates. These holders are provided with both tapped holes for the screws and dowel pin holes, located so that any punch plate within its boundary may be fastened to it. The largest punch holder, I, is illustrated in Fig. 2. The holder is of 1¼-in. hot rolled steel, and is machined 12¼ in. square. It has a punch holder stem J inserted for fastening the punch holder to the press ram. The stem J is turned out of 1½-in. hot rolled steel, 3½ in. long. The upper 2¼ in. is left 1½ in. dia. while the bottom part is turned down to 1¼ in. and threaded with a special 12 p. thread so that it can be screwed into the punch holder. The stem is then permanently anchored by a 5/16 in. 18-thd. headless setscrew.

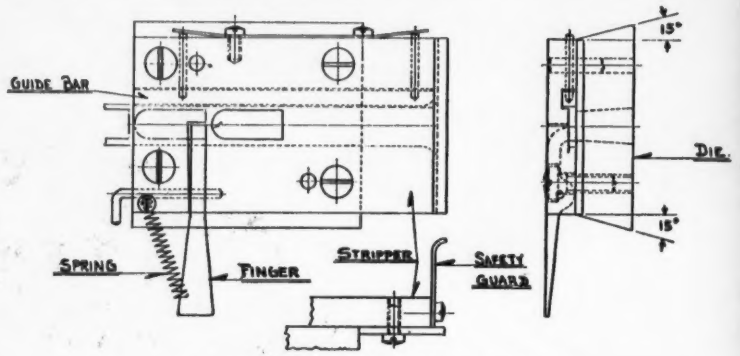

Fig. 3—Lower part of a low activity blanking die.

A simple "low activity" blanking die is illustrated in Fig. 3. The cutting dies, like those used in the previously described shoe, are of tool steel. Judging by past performance it has been definitely proved that for the best results a die of approximately 1 in. thickness is the most satisfactory. A 1-in. die stands up well during steady running and danger from breaking is practically eliminated. This is partly due to the fact that, outside of the blank opening, there are but two dowel pin holes and the usual four stripper screw holes contained within the die.

For cutting very thin soft metals where the wear on the die is of the minimum and regrinding will be infrequent, the die thickness may be reduced. The holes may be counterbored from the back of the die in the case of a piercing operation, thereby reducing filing time. With the use of a filing machine the dies may be filed out quickly to suit the template furnished to the tool maker.

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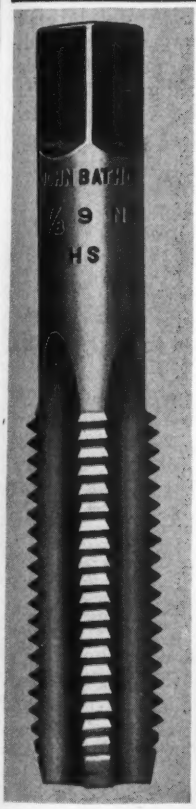

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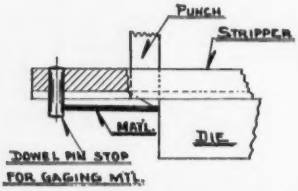

Fig. 4 — Illustration of simple method of gaging the length of material.

cold rolled steel, left unhardened, and is actuated by the flat clock spring in the rear of the stripper. The stripper channel through which the material passes is made 1/32 in. deeper than the thickness of the material.

The punches are of tool steel and—like the die—are hardened to about 80-85 points Scleroscope test. They are press-fitted into the ½-in. hot rolled steel punch plate, which is drilled and tapped to suit the standard punch holder previously described. A standard stock finger outfit is used for spacing the blanks correctly and these parts may be used over on another die later. The piercing punches also may be saved and used again.

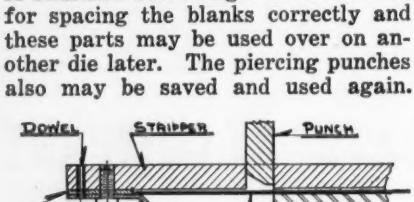

Fig. 5—Material gage and rest for thin material.

On cutting off dies, the end stop for gaging the length of the blanks may be made by using a dowel pin as shown in Fig. 4. This method is only practical when the blank material is 1/16 in. or over in thickness and not so long that it will sag downward. When the blank is long and the material is thin, it is best to provide an end stop like the one shown in Fig. 5. In the case of severing dies, a lift-latch stop is required. This type of stop was explained in an earlier issue of MODERN MACHINE SHOP.

When the blanks are large and there is a large overhang between the two supporting ledges of the die shoe, it is best to use a separate bolster plate under the die, the plate being screwed and dowelled to the die. In such cases the die is made straight on the sides and the 15-degree angles are machined on the sides of the die supporting plate. The plate is made of 1-in. hot rolled steel

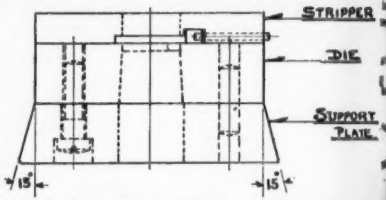

Fig. 6—The die mounted on the supporting plate.

burned out to size and slab ground on the top and bottom surface. Clearance holes to allow the blank to fall through are machined into the supporting plate. In Fig. 6 the support is shown with the die mounted and fastened in place.

These dies may be standardized for width, and bars in long sections may be planed up with the taper on the sides and carried in the storeroom. Any required length may then be cut from them to suit the job on hand. This method will reduce the individual machining time of the tools and a certain amount of savings may be obtained.

The greatest saving is, of course, the cost of the individual die sets, but when an item that is being produced requires four or five tools in

a set, this saving will greatly reduce the manufacturing cost. A good feature of tools of this type is that —as quite often happens—the tools are required for repeat or follow up orders of larger quantities and they can either be run as they are or, if found advisable, they can be set into

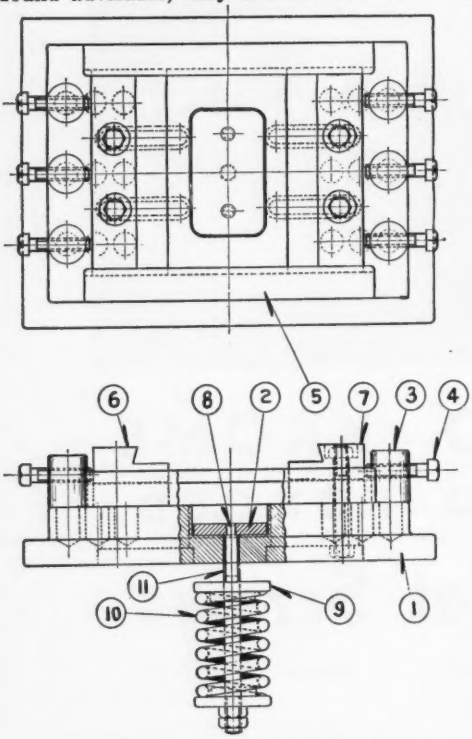

Fig. 7—Top and side views of the bender shoe.

die sets equipped with guide pins and made into permanent tools without any other alterations.

Construction of Bender Shoe

A drawing of the bender shoe is shown in Fig. 7. The base 1 is made of 2½-in. hot rolled steel plate machined and slab ground to 2¼ in. thickness. Four "T" slots are machined in place and a 3x5-in. opening is profiled into the center 1-3/16 in. deep for the permanent stripper plate 2 to set in. Items 3 and 4 are the studs and set screws previously described. On this die shoe, however, both jaws are movable. This requires 6 studs and set screws, 3 on each end of the shoe.

The jaws are made of hot rolled steel 2¼ in. high and 3 in. wide. The 15-degree dovetail angle is machined ⅝ in. high and has a 1½-in. wide seat. The ends are machined in ¼ in. to allow the guide rail 5 to set over the jaws 6 and 7. There are two guide rails; one at each end. These rails also act as a safety guard both to the press operator and to the die. The guide rail is machined from hot rolled steel bar and is fastened down to the top of the bender shoe with four ⅜ in. 16-thd. fillister head screws.

The permanent stripper carries the ½-in. Stub steel stripper pins 8 that are slip-fitted into the holes in the shoe.

The spring assembly which actuates the stripper, is the compression type and the holders and spring 10 may be changed to suit the material that is being bent. It is best to have the steel stud 11, which is used to hold the spring assembly to the die shoe of sufficient length to allow for adjustment in order to obtain the correct amount of tension on the blank to prevent it from slipping out of position.

The operation of setting the die into this shoe is the same as on the previous shoe. The set of three punch holders provided with this shoe will take care of any size punch plate that may be used on this tool. It may be noted that in addition to the screw holes in the plate there is an extra one which passes down through the center of the punch stem; this hole was provided because in some

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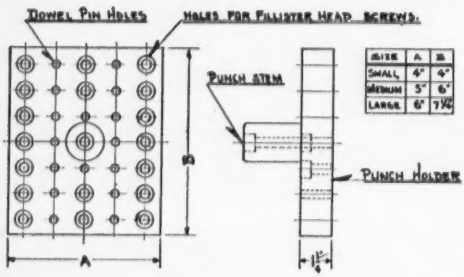

Fig. 8—Punch holders used with the bender shoe pictured in Fig. 7.

cases one screw is all that is required to hold the punch in place and, by turning the punch plate around, the two dowel pin holes are available for setting the punch and keeping it in alignment. The punch holders are illustrated in figure 8.

Construction of the Bender

A low activity bender is shown in Fig. 9. The bender block is machined from hot rolled steel bar stock and finished up on the inside by grinding. The 15-degree dovetail is machined on the sides for holding purposes.

The two bending jaws are made of tool steel, hardened, and are held in place by the 5/16-in. 18-thd. fillister head screws. All surfaces of the jaws are ground to size. The stripper is made of tool steel and carries the pilot pins on which the blank is located prior to being bent.

The stripper is hardened and ground to size. The stub steel stripper pin is force-fitted into the bottom of the stripper and slide through the holes in the bender block. The bottom of these pins rest on the permanent stripper in the bender shoe. The stripper is actuated by the spring assembly previously described. A brace is mounted on the sides of the bender block both for added support to the block and also to safe guard the press operator.

The punch is made of tool steel, hardened and ground to size. It is usually mounted in its own punch plate, but occasionally may be mounted directly to the punch holder as shown in the illustration.

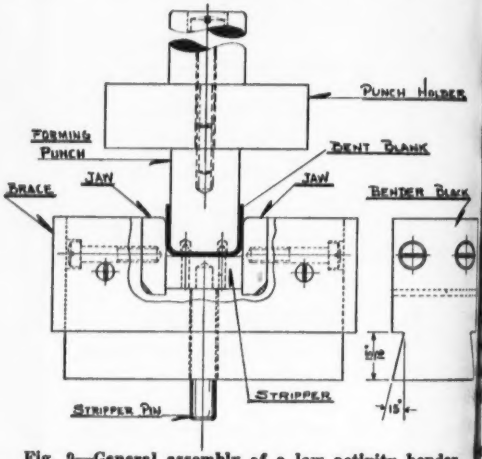

Fig. 9—General assembly of a low activity bender.

Frisco-Memphis Shops

(Continued from Page 52)

of course, machined first to provide an accurate fit for the section of ¼-in. plate. When the plate becomes worn, it is a simple matter to heat the weld, knock out the old plate and replace with a new one—which can be done without further machining. This expedient makes it possible to use the tank truck bolsters indefinitely.

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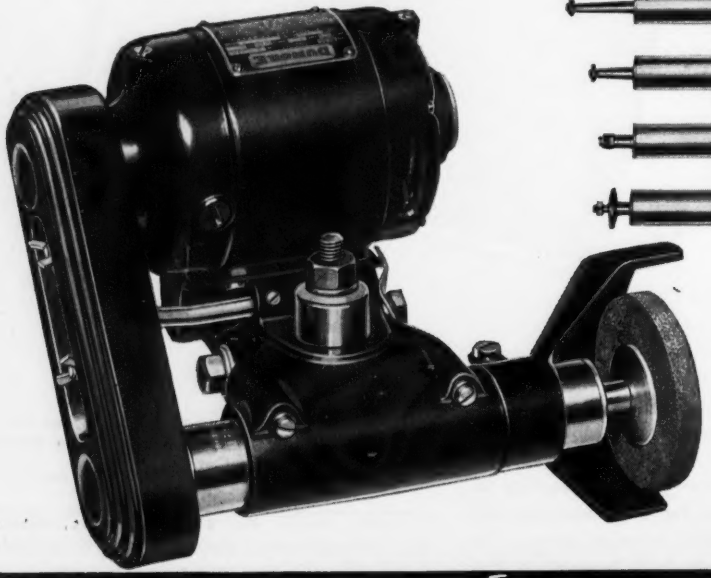

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Fig. 1—Tube camera, which provides an accurate moving picture record of the interior wall of a hollow body.

Inspecting Hollow Cylindrical Bodies with a Movie Camera

By Rene W. P. Leonhardt
Berlin, Germany

Apart from the large savings in time implied, mechanical testing has the advantage of complete dependability, due to the fact that the mechanical method precludes the possibility of error as a result of inattention or fatigue. A mechanical testing instrument for the inspection of hollow cylindrical bodies has been developed by the Askaniawerke, Berlin-Friedenau, in collaboration with the AEG Turbinenfabrik, in the shape of a tube camera, as illustrated in Fig. 1. The instrument is intended for use in examining the bores in turbine shafts, steam pressure pipes, hollow cylinders, fire-tubes, and similar long pieces for material defects, scale pockets, rust pits, wear, erosion, and so on.

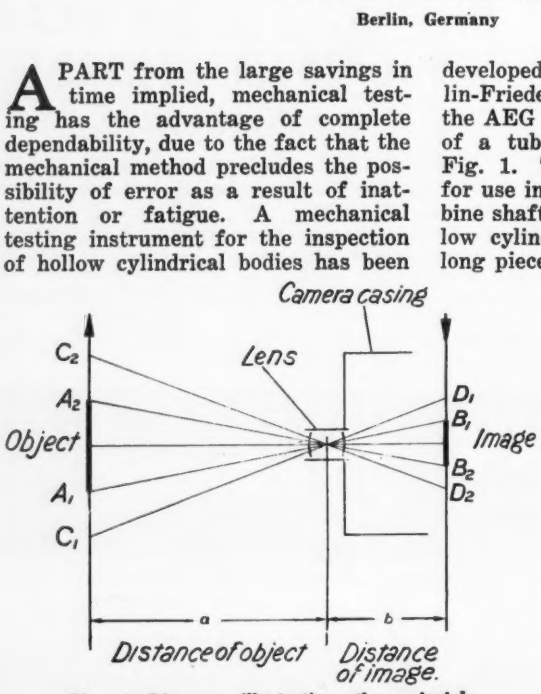

Fig. 2—Diagram illustrating the principle upon which the tube camera operates.

The advent of the tube camera is of particular significance to the machine-building industry because the examination of the internal walls of hollow bodies of the types mentioned has until now been extremely difficult and costly. It has also been dependent upon the skill of the individual inspector, which in such cases has never been basically reliable.

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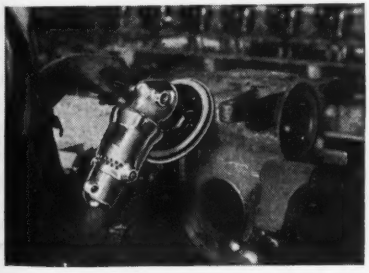

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forms of apparatus used for such inspection consisted of periscope-like observation tubes, carrying at the head end an incandescent lamp and prism to render the image of the internal wall accessible to observation and examination. This instrument is introduced into the hollow body and examination is made by gradually moving the instrument forward and back in a rectilinear or spiral path over the entire length of the internal wall. One serious drawback to this method consists in the lack of assurance as to whether or not the observer has actually viewed all portions of the internal wall, and the resultant doubt as to the dependability of the inspection. Even apart from this constant element of doubt, however, the employment of the observation tube is expensive, especially in view of the fact that inspection can be carried out only by trained and hence high-priced help.

The tube camera retains the basic form of the observation tube, but the eye of the inspector is replaced by the optical system of a cinematograph camera, and his hand by a mechanism which automatically shifts the observation tube forward and back and indexes it by the required angle after each exposure traverse. This method provides positive assurance that all parts of the hollow body are examined on the one hand, while, on the other, it provides a film record which can be preserved as documentary evidence for later use in possible questions or legal disputes.

In the tube camera, the matter of feeding the film presented a problem which was solved in a wholly unusual manner. The principle of the instrument is shown in the diagram Fig. 2. If it is assumed that A^1-A^2 represents the length and extent of a body, then the image of this body is projected on to the film at B^1-B^2. If the object is moved in the direction of the arrow from C^1 to C^2, then the image will shift from D^1 to D^2. When a moving object is to be photographed on the film, therefore, the film must be moved in the opposite direction at a corresponding rate, if a perfectly sharp image is to be obtained. Since the instrument is specifically intended for photographing the inside of hollow bodies of small diameter, it is necessary to accomplish the purpose without introducing the camera into the work. The arrangement adopted is shown in Fig. 3. A 3.25m. (10½ ft.) tube (7) equipped with an objective head is connected to the camera (1), and this tube is introduced into the body to be examined. By this arrangement, it becomes possible to inspect tubes and hollow shafts with bores down to 75 mm. (3 in.) in

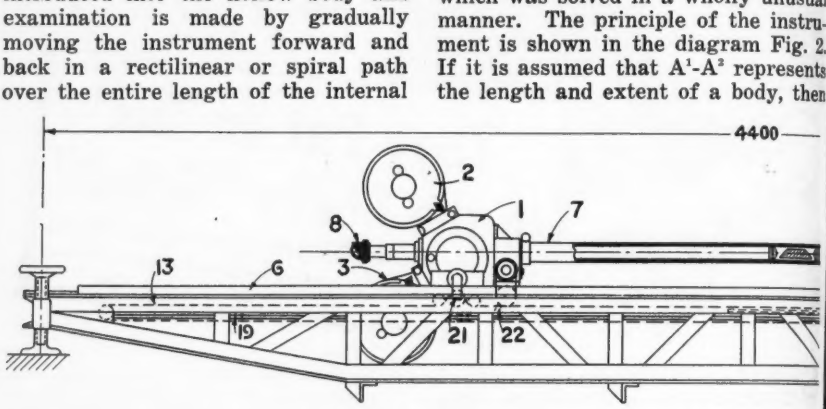


Fig. 3—Drawing of tube camera.

diameter. It will be clear that by varying the dimensions, it will be possible to design the instrument for the inspection of bores of still smaller diameter.

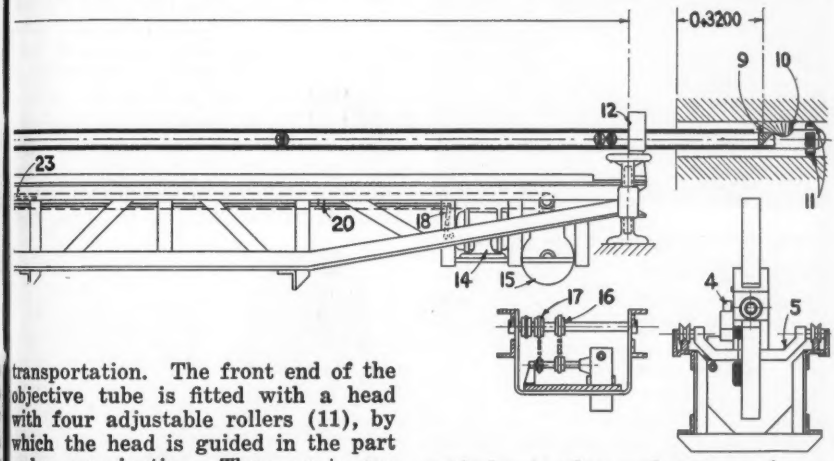
The objective tube and camera rest on a carriage (5) running on rails on a 4.4 m. (14½ ft.) bridge girder (6). For supporting the objective tube, the girder carries at the head end a guide bracket (12) in which the objective may be clamped during transportation. The front end of the objective tube is fitted with a head with four adjustable rollers (11), by which the head is guided in the part under examination. These parts can be seen in detail in Fig. 4.

Behind the roller guide in the objective is a 16-V, 90-CP lamp (10) for illuminating the field opposite the head. Additional elements in the objective tube are a deflecting prism, an objective, and a rectifying prism. This system projects the image of the wall field onto a film in the camera. The cable from the lamp and a rod for adjusting the objective are carried under U-shaped channels to either side of the objective tube.

The blank — and exposed — film boxes (2 and 3) are removably attached to the camera, as may also be seen from Fig. 5. In addition, the camera is equipped with a film-length counter for ascertaining the length of the exposed film-section at any moment, and a focal-plane shutter permitting adjustment of the time of exposure. Focusing and examination of the image during exposure are effected with the aid of a built-in magnifier provided with an automatic shutter.

Since at each traverse of the tube through the bore only a section of the wall is photographed, the objection tube must be indexed around its optical axis after each traverse by an angular amount which depends upon the diameter of the bore. In this indexing motion of the objection tube, the deflecting prism also participates. Unless this were compensated for, it would result in a noblique image of the field on the film. This difficulty is avoided by the incorporation, into the optical path, of the rectifying prism, which follows the indexing of the objective tube and thereby compensates for the angular shift.

The indexing motion of the objective tube after each traverse as well as the operation of the film and the control of the forward and return motions of the carriage are entirely automatic. Power for these movements is derived from a motor (14) built



into the bridge girder. This motor moves the camera and effects all control motions over a gear (15) and

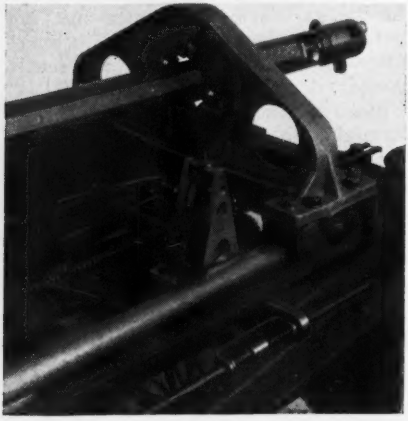


Fig. 4—Objective end of tube camera.

selective reductions (16 and 17) in conjunction with steel ribbons and chains. The forward and return motions of the carriage are controlled by a motor starter (18) with adjustable stops (19 and 20). The indexing of the objective tube is brought about by the combined action of a geared reduction, clutch stops, and an endless chain (13).

In order to ensure exactly-timed running of the film and the camera carriage, the drive is transmitted by a steel ribbon having the same perforations as the film. The perforations in the steel ribbon engage a toothed drum (21), which transmits the drive over a transmission to the film-feed reel of the camera. During the return of the camera, the clutch disconnects the film drive, while a special switch interrupts the illuminating lamp circuit. When the entire inside of the tube has been gone over, or, in other words, after one full turn of the objective tube, an automatic terminal control stops the entire apparatus.

Figs. 6 to 12 show a number of specimen exposures which demonstrate the action and performance of the tube camera. Fig. 6 is a view of a rough-bored welded-seam steel tube. The seam is noticeable throughout the length of the image, where it is clearly marked by the different appearance of the tool grooves at the right and left. Fig. 7 is of the inside of a shaft drilled with a half-round drill and showing a rust spot near the upper end, indicated by the darker color. In Fig. 8, the bore has been re-turned at the lower end.

Fig. 9 is of a finish-turned section, in which the tool grooves are so fine that the finish approaches the polished condition. By inserting the steel tape, identification of defective points in the bore record is facilitated, since by photographing the pipe sec-

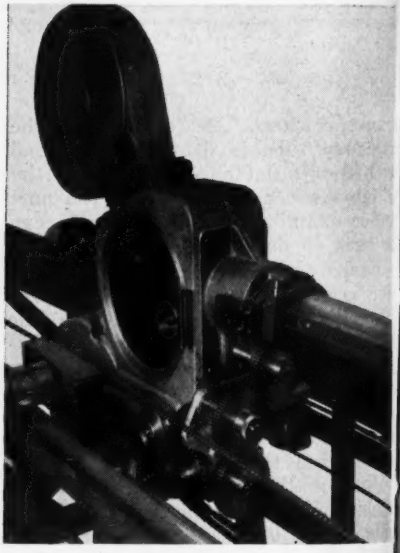
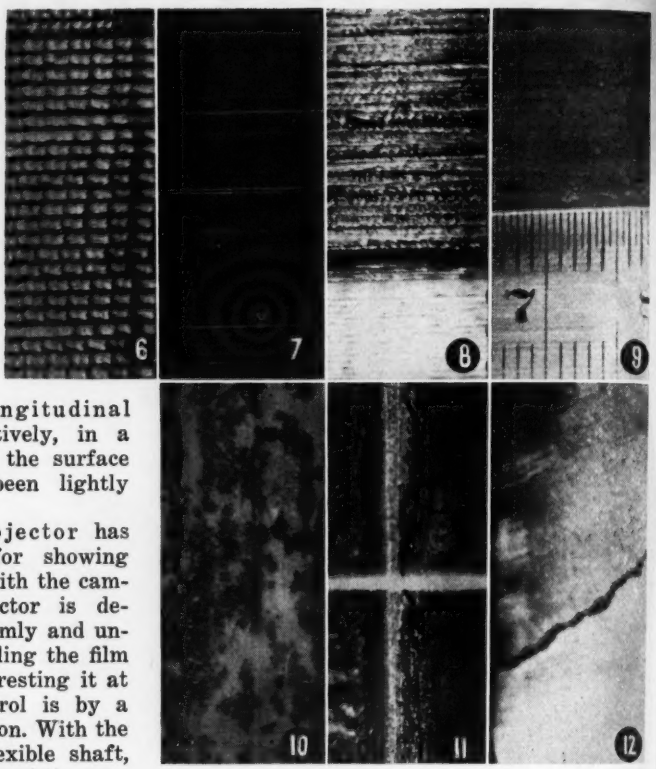


Fig. 5—Recording mechanism of tube camera.

tion with the scale, it is easy to know to which traverse the film strip belongs. Fig. 10 shows rust pits in a drawn tube, and Figs. 11 to 12 reveal



Figs. 6 to 12—Samples of photographs of the interior walls of hollow cylindrical work-pieces. Magnified x 2.

a cross—and longitudinal fracture, respectively, in a cast-iron saddle, the surface of which has been lightly filed.

A special projector has been provided for showing the films taken with the camera. This projector is designed for uniformly and uninterruptedly reeling the film as well as for arresting it at any point. Control is by a simple lever motion. With the aid of a long flexible shaft, the control handle of the projection apparatus may be actuated from some distance, thereby enabling the person in charge of the inspection to control the camera himself and cause it to run forward and backward or stop as he desires.

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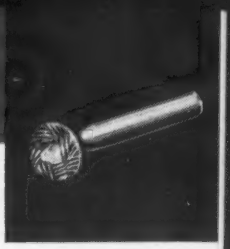

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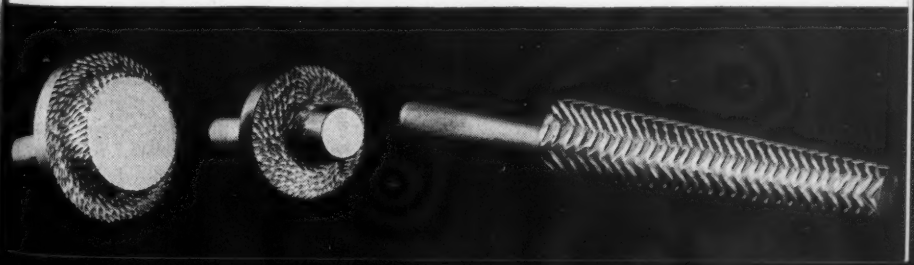

Cast Iron Parts Successfully Repaired by Arc Welding

By A. F. Davis,
Vice President, The Lincoln Electric Company, Cleveland, Ohio

NECESSITY, mother of invention, has resulted in a widespread use of the electric arc welding process for repairing broken cast iron machine parts during the lean years of '30-'35. Many machine shops have been saving hundreds and thousands of dollars annually through the use of recently developed welding electrodes and concurrently improved cast iron welding procedures. There seems to be little doubt now as to the weldability of cast iron—it's just a matter of following a few simple rules.

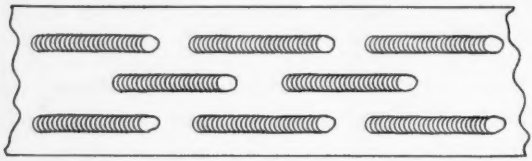

Fig. 1—Weld metal should be deposited in short lengths and then allowed to cool.

Former difficulties centered around the fact that, upon cooling, the molten weld metal shrinks more than the cast iron on which it has been deposited. Being brittle, especially after a heating and cooling, the cast iron sometimes cracked under the strains resulting from this unequal shrinkage. To offset this, welders sometimes preheat the casting, but this usually requires expensive, time-consuming dismantling and setting-up.

The advantage of the arc welding process is that this dismantling and preheating can be eliminated. The arc heat, being more concentrated, is applied to the immediate vicinity of the weld, minimizing the embrittlement of the cast iron and confining the expansion and contraction to a local area. Confined, the strains can more readily be taken care of by the welder.

Keep the Casting Cool

A number of precautions are taken in welding cast iron in order to minimize contraction strains. The principal ones are listed herewith.

1. Use a low-heat electrode. "Ferroweld" is used extensively because its melting rate is high at a low welding current (approximately 80 amps.). A short bead can be started and speedily completed before the casting has time to absorb much heat. Use reversed polarity (electrode positive, work negative).

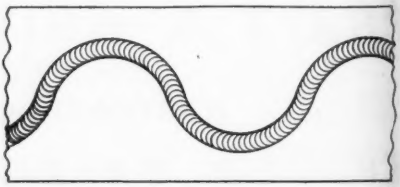

Fig. 2—Depositing weld metal in curved lines will help to reduce strains.

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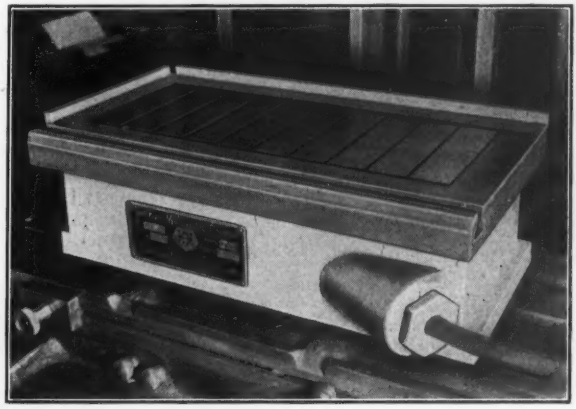

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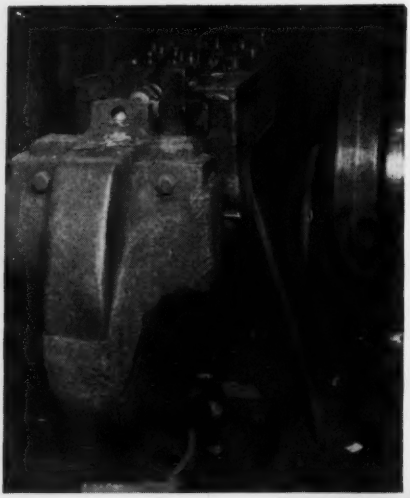


shrinkage due to cooling.

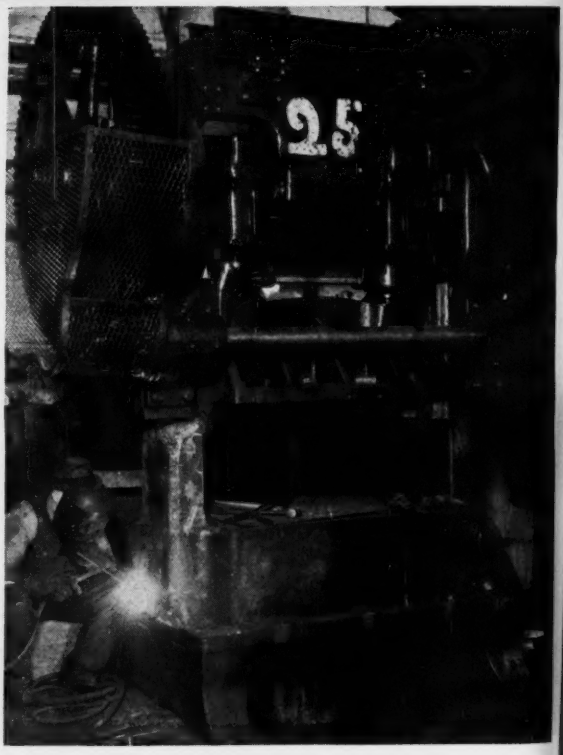
4. **Weld in curved lines.** Where possible, instead of making a sequence of short beads in order to prevent accumulation of strains, the weld can be made in a curved line, as shown in Fig. 2. Here too, it is advisable to weld a short bead at a time, then let it cool off.

Work Should Be Thoroughly Cleaned

Proper preparation is important. Every job must be thoroughly rid of all foreign matter—dirt, oil, and so on—before starting to weld. Also, after each bead has been laid and has cooled off, every bit of scale should be removed before continuing with an adjacent bead.

When the cast section is thicker

Fig. 3 (Above)—This repaired cast iron punch press now does heavier work than before it was broken. Fig. 4 (Right) — Heavy machinery can successfully be repaired by arc welding.



2. **Weld intermittently.** Make beads not over one or two inches long, then allow the weld to cool for from three to five minutes. If the work is large, lay another bead some distance away while the previous one is cooling. This intermittent welding, as illustrated in Fig. 1, will prevent an accumulation of strains in any one place.
3. **Peen the bead while hot.** Doing this lightly immediately after laying stretches the weld metal and thereby counteracts the weld

than ½ inch, vee out the crack so that fusion will go down into the casting, adding to the strength of the weld. On parts subject to severe stresses in service, such as the punch press shown in Fig. 3, it is desirable to reinforce the cast iron with steel studs, in addition to veeing out the weld. These studs should be screwed into the casting along the rim of the veed-out crack. The weld will then cover the studs.

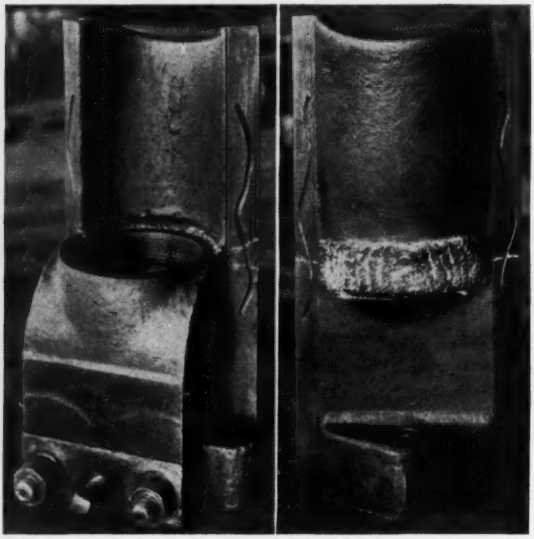


Fig. 5—This punch press ram was welded in the machine, thus maintaining alignment.

In extreme cases, such as the large press shown in Fig. 4, the broken part can be reinforced with steel plate, welded to the casting.

The punch press shown in Fig. 3 was formerly used for punching 15/16 in. holes in 7/8 in. plate. Its broken frame was repaired by arc welding, using "Ferroweld" electrodes. Proof of the strength of the repairs is shown by the fact that the press has been in constant use for several years, doing heavier work than before—punching out 1⅛ in. holes in 1 in. plate.

After unsuccessfully trying to repair the press frame shown in Fig. 4 by other methods it was decided to use arc welding. The leg was studded with eleven ¾ in. x 3 in. studs; ¾ in. boiler plate was then welded to the casting and the studs. The repaired press has now been in service for a number of years.

Fig. 5 shows a cast iron ram for a punch press repaired with "Ferroweld" electrode. The press on which this ram is used is in constant use punching holes as large as 7 in. in diameter in 10-gauge steel. The break, about 22 in. wide, occurred in a line across the ram, as shown by

the chalk marks. The crack was veed out with the vee about 2 in. wide at the back, leaving about ⅛ in. of metal at the bottom of the vee. The part was then tack welded at the inner ends of the chalk marks. Short beads were laid intermittently along one side of the crack, then on the other. All welding was done in vertical position in order to leave the ram in the press and maintain its

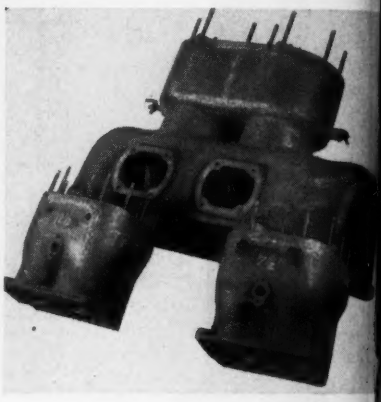


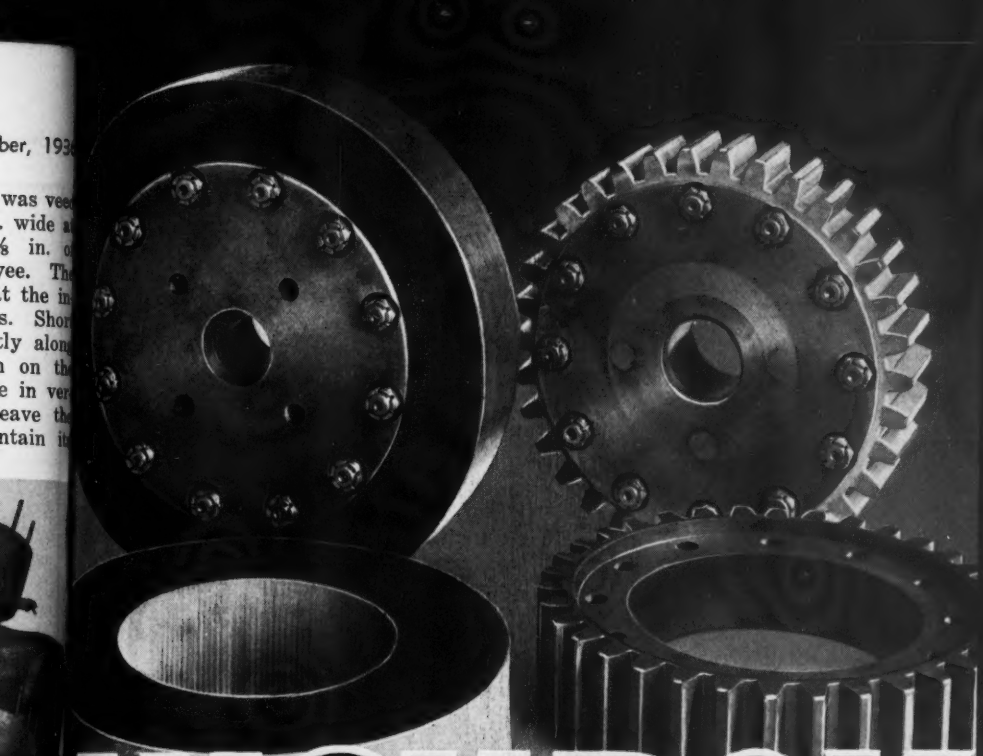
Fig. 6—This compressor cylinder casting was cracked in several places. Repaired by welding, it is now tight and strong.

alignment. The outside flanges of the ram, which fit into guides, were ground down after welding.

The cast iron block of the compressor engine shown in Fig. 6 was repaired with "Ferroweld" electrode after the metal had been cleaned and the crack had been veed out.

The 10-ft. bending brake shown in Fig. 7 is a good example of time and money saving in machine shop use of arc welding. The cast iron rail was broken, and to obtain a new casting would have required eight or nine weeks. The shop cut a steel part 5 in. thick to fit; it was welded in place, and the brake was back in service in 48 hours.

The cast iron gear on the above



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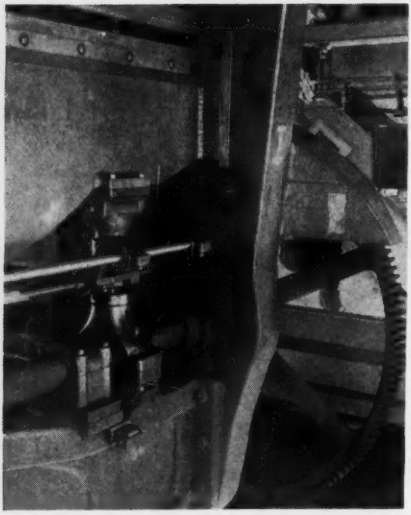


Fig. 7—The ram and gear of this 10-ft. bending brake were speedily and efficiently repaired by arc welding.

brake was broken five years ago. The casting was cleaned and studded, the break welded, and a reinforcing strip was welded in place.

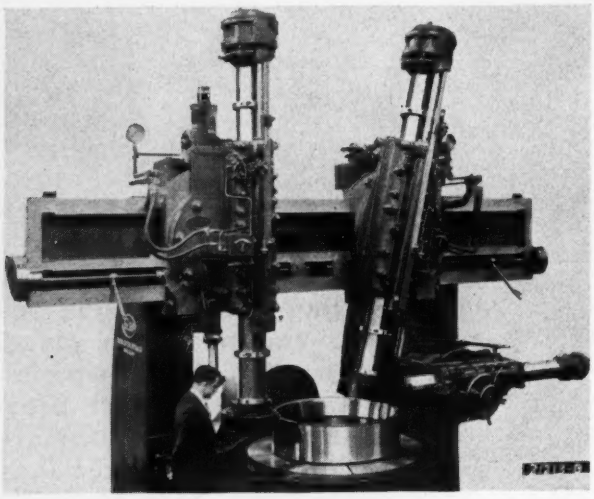
New Non-Ferrous Electrode Developed

For applications in which the cast iron part does not require the high strength secured by using a steel electrode, such as "Ferroweld" or for welds which should be readily machinable, some welders prefer a non-ferrous rod. An electrode of this type: "Aerisweld", has been developed recently. This is a coated rod which give a homogeneous deposit possessing the characteristics of true phosphor bronze. Like "Ferroweld", in welding cast iron, it should be used with low current values (about 70 amps. for the 5/32-in. rod). The electrode should be positive; the work negative.

Modern Equipment at Work

Timken Installs World's Largest Precision Grinder

TO GRIND the cups and cones required in some of the large Timken Bearings now used in industry, the Timken Roller Bearing Company at Canton, Ohio, has installed the Niles grinder shown in the illustration. This machine, which weighs 105,000 pounds, required three cars to transport it and stands 18 ft. 6 in. above the floor level.



World's Largest Precision Grinder

With this grinder the Timken company is enabled to grind the large cups and cones to a new degree of accuracy considering their size, a test run on a bearing cup of 47 inches diameter showing a "runout" of only 0.00025 inches.

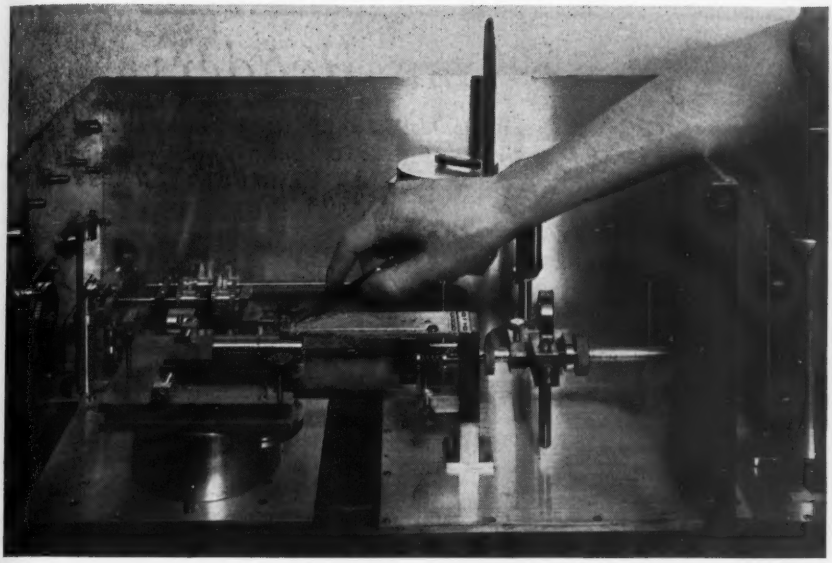
The machine carries a magnetic chuck 66 in. in diameter and is driven by a 5 h.p. variable-speed motor. The machine is equipped with two vertical spindles approximately 12 ft. long, each driven by a 25 h.p. motor at 1200 r.p.m., and one horizontal spindle driven by a 5 h.p. motor at 1800 r.p.m. Three surfaces can be ground at one setting, and included angles up to 60 deg. are within the range of the machine.

Ten motors are required in the operation of the unit, and the two vertical spindles are reciprocated by means of a hydraulic system. Precision built throughout, the grinder is, of course, equipped with Timken Bearings at all points.

Photographing Finish on Polished Steel

A FINE diamond point, a tiny high-grade mirror mounted on a hinge of metal five ten-thousandths of an inch in thickness, and a magnifying system of reflecting mirrors are the "jewels" of this sensitive device which photographs surface irregularities of highly polished steel. The irregularities may be magnified 1700 times vertically and 64 times horizontally.

The machine is known as a profilograph and was designed by University



With this device irregularities ordinarily invisible to the naked eye are magnified so that they look like mountain ranges.

of Michigan engineers. The above unit, the third of its kind in the world, is a part of the equipment in the new chemical and metallurgical laboratory that has been built for the Ford Motor Company.

In the above view, the pencil points to the tiny mirror. Below the mirror is the diamond point, and beneath that the Ford V-8 piston pin specimen. As the specimen moves along under the diamond point, minute irregularities cause the mirror to bob up and down. A beam of light focused on the mirror from the cylindrical lantern at right is reflected to the system of mirrors and finally to a photographic negative on a revolving drum.

The path of the diamond point over one-eighth of an inch of a specimen is recorded on the negative as a line eight inches long, on which irregularities invisible to the naked eye, magnified 1700 times, may look like mountain ranges.

KARNETICS. The name Karnetics is applied to a magnetic holding device consisting of a block made up of alternating laminations of steel and non-magnetic material which conducts the magnetism from a magnetic chuck to the piece to be ground and holds the piece as firmly as though it rested on the magnetic chuck itself. Thus the Karnetic becomes a magnet by conduction but, inasmuch as it does not generate magnetism, consumes no current. The Karnetic is made by the Kar Engineering Company, Inc., 200 Hudson St., New York, N. Y.

The use of the Karnetic is said to practically eliminate the time required in setting up certain types of work, does away with special fixtures and jigs, and permits of all angle setups. From 80 to 85 per cent of the holding power of the magnetic chuck is delivered by the Karnetic. A copy of a folder describing the Karnetic and its uses can be had by any manufacturing executive, maintenance superintendent, or mechanical engineer who will address the manufacturer as above, using the firm letterhead.

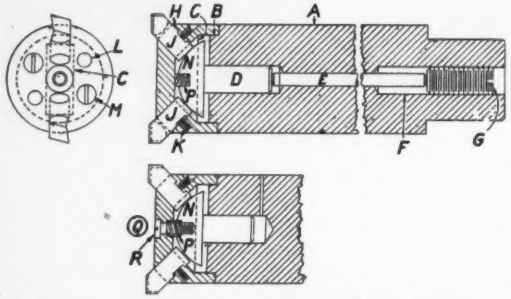
Ideas from Readers

This department is a clearing house for ideas . . . If there is a "'kink" or short cut in use in your shop, send in a description of it . . . Each one published will be paid for.

Double Cutter Boring Bar of Simple Construction

By C. J. Becker

A Double-cutter, end-type cutting and boring tool designed for use on a turret lathe is shown in the drawing herewith. This tool was made especially to bore heads of small combustion engines, but it also can be used to good advantage on many other jobs in the average shop where expensive boring tools are not available.



Drawing showing design of double-cutter boring bar

The tool consists primarily of the bar A, which is turned on one end to form a shoulder as indicated at B. Across the face of the shouldered section a slot, which is indicated at C, is cut. The hole D is drilled and reamed at the slotted end. At the opposite end another hole, shown at F, is drilled and tapped for the adjusting screw G. A connecting hole E is drilled through the remaining length of the bar.

The tool head H, which is held in position by means of the dowels L and the screws M, is bored and chamfered on the inside so as to make a snug push fit on the shouldered section B. Two holes shown at J are drilled and reamed at an angle of forty-five degrees to receive toolbits. At right angles to each hole are drilled two clamp screw holes K for clamping the bits in place. The toolbits are adjusted by means of the screw G, which controls the position of the backing wedge N. The head of wedge N is made a sliding fit in the slot C and the shank a sliding fit in the hole D. A spring at P maintains a proper amount of tension on wedge N at all times.

In cases where adjustment from the rear end of the bar cannot readily be made an alternative design, shown at Q, can be substituted. In this case the movement of the wedge N is controlled by the screw R, the spring P being of larger size in order to provide room for the screw to pass through it.

Turret Lathe Setup for Forming Bevel Gear Blanks

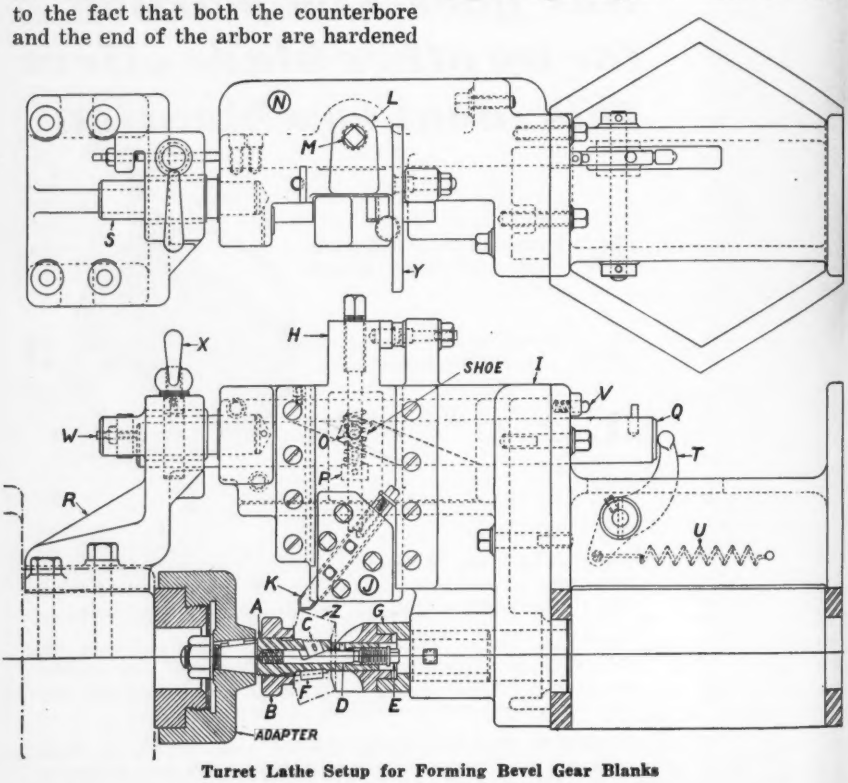
By John A. Honegger

THE accompanying illustration shows a complete turret lathe setup for forming the front face and outside diameters of a bevel pinion. The setup consists of the adapter into which has been fitted an arbor A, carrying a locating collar B. This arbor has a taper which corresponds with the taper inside the bevel pinion Z.

At C is shown a shoe which forces the pinion against the arbor by the action of a push rod D and screw E.

A key F in the arbor prevents the pinion from turning. The outer end of the arbor is a snug fit in the interior of the formed counterbore G. Due to the fact that both the counterbore and the end of the arbor are hardened which projects beyond the housing I covers the compression spring O. The action of the compression spring is restricted by means of the collar P.

Adjacent to the rear side and sliding at right angles to slide H is an-



Turret Lathe Setup for Forming Bevel Gear Blanks

a minimum of wear is the result and concentricity is maintained.

The moving mechanism for cutting the bevel pinion consists of a vertical slide H riding in the gibbed recess of the housing I. On this slide is mounted a tool block J in which the adjustable tool K is clamped. A lug L projects at the rear of the slide H and is threaded to receive the adjustable spring rod M. A flange N other slide Q in which an angular slot is machined which corresponds with the angle of the bevel gear. Pivoted on the rear of slide H and riding in the slot of slide Q is the connecting shoe between slide H and slide Q. A bracket R which serves two purposes is mounted on the spindle housing. It acts primarily as a pilot housing for the pilot S which properly aligns the housing I with the center line of the

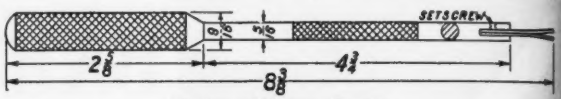
lathe, and secondarily as a stop for the proper location of slide Q so that slide H can be operated. The pusher arm T, actuated by the spring U, tends to keep slide Q in the forward position, the bumper pin V being provided to break the force of the slide. Vertical slide H is kept in its lowest position until the forward end of the slide Q strikes the stop screw W in the bracket R. When slide Q is in this position binder handle X clamps it in position. Any further movement forward will cause the slide H and tool K to travel upward at the angle set by the slot in slide Q.

When the tool has traveled its complete distance the operator unclamps binder X and holds handle Y down while the turret is moved back until it clears the work. When handle Y is released slide H returns to the original position. In addition to the straight bevel, irregular outlines can also be cut merely by substituting an irregular cam slide for the vertical slide.

Screw Starter for Assembly Work

By C. F. Fitz

ON assembly jobs where screws are positioned in recesses which are not readily accessible to the average screwdriver and where brass screws eliminate the use of a magnetic screwdriver, the screw starter shown in the accompanying illustration can be used to good advantage. This screw starter, which was cut from aluminum bar stock, consists of a handle and a shank which is slotted



Design of Screw Starter

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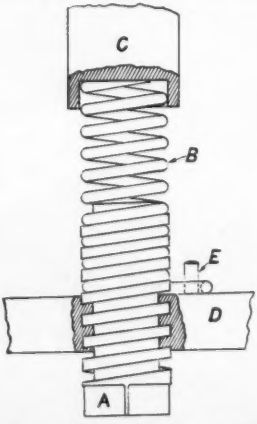
at one end to receive two small pieces of spring steel. The pieces of spring steel are held in the slot by means of a No. 6 32-thread setscrew. The large or handle end as well as the shank are knurled to provide a good gripping surface.

To use the screw starter, the spring steel strips are pressed together and inserted into the slot of a screw, then the tool is used as an ordinary screwdriver. In some cases this screw starter can be used to complete the operation, thus eliminating a change to the usual type of screwdriver. Screw starters of the type described here can be made in various sizes to take care of a variety of assembly jobs. The experienced assembly man can readily see the advantages of this type of screw starter insofar as time and labor are concerned.

Adjustment for Compression Spring

By L. Kasper

A SIMPLE setup for adjusting a compression spring is shown in the accompanying illustration. The setup consists primarily of the screw



Drawing illustrating method of adjusting a compression spring.

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A, a stationary base D, and a recessed plunger C which forms a seat for one end of a helical compression spring B. A square thread is cut on screw A of the same pitch as the spring, and the screw is squared on the end so that it can be turned with a wrench. The lower end of spring B is formed into an eye which is anchored by pin E on the stationary part D and thus prevents the spring from turning.

When screw A is turned clockwise it winds into the spring coil B and thus the effective length of the spring is reduced. The effect is to increase the resistance to compression with slight change in the initial pressure against plunger C. If the spring were compressed in the usual manner to increase the resistance to deflection, the initial tension would be increased considerably.

Quick Method of Estimating Length of Material in Any Roll

By W. F. Schaphorst

In machine shops where material such as wire cloth, paper, hose, belting, cable, chain, rope, wire, metal band, canvas, and so on comes into the shop in rolls, and where it is desirable to know the length of such

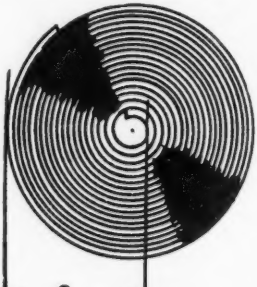
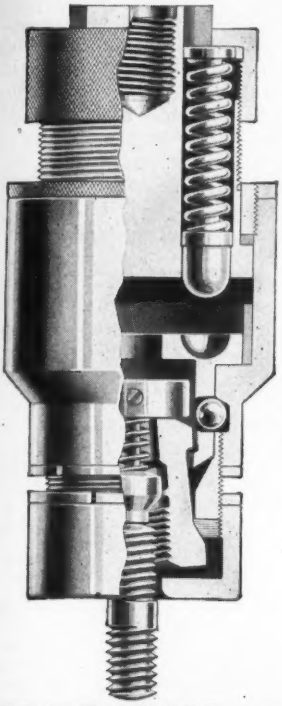


Diagram illustrating method of measuring material in a roll.

material, the following method of calculating its length is one that will save both time and labor. All that is needed in order to compute the length of the material by this method is the measurement S in inches as shown in the illustration, and the number of turns in the roll. These two quantities multiplied together give a product which, when multiplied by the constant 0.2618, gives the



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With the Titan Stud Setter, you can set studs with a uniform degree of tightness without straining or mutilating threads. The Titan is a new controlled drive type for driving stud bolts and is full automatic in loading and releasing. This power-driven unit is adaptable to all types of drill presses, air or electric tools, both portable and stationary. It successfully operates at high or low speeds. Positive in driving and automatic in releasing, the studs may be set to any predetermined degree of tightness.

Practically any type of stud, including short length studs, can be seated with this new Titan tool. The great capacity, speed range and utility of this production tool, plus the added economy which its safety features assure through automatic operation, combine to make the Titan Stud Setter a profit-earning tool wherever it is used.

Write for new illustrated circular.

TITAN TOOL COMPANY

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FAIRVIEW, PENNA.

length of the material in the roll in feet.

For example, if the distance S is 10 inches and the number of turns is 10, the roll contains 26.18 feet of material. To check this method another example can be taken where one turn of metal band has S equal to 10 inches. The roll is a true circle, and the distance S is the diameter of that circle. The length of the band is equal to the diameter times Pi (3.1416) which in this case equals 31.416. When 31.416 inches is divided by 12 the quotient or answer is 2.618 feet. For 10 turns as used in the first example the result is 10 times 2.618 feet or 26.18 feet.

When this method of calculating the length of material in a roll is employed the fact that the roll is tightly or loosely wound does not in any way alter the result.

TITAN CONTROLLED DRIVE STUD SETTER. This four-page bulletin, now being issued by Titan Tool Company, Fairview, Pa., describes a stud setting tool which is fully automatic in loading and releasing and is adaptable to all types of drill presses or air or electric tools, either portable or stationary. The setter is said to be positive in driving and automatic in releasing, thus making it possible to set studs to any predetermined degree of tightness. Copy of the bulletin free upon request.

SIP No. 4B AND 5B HIGH SPEED JIG BORERS. This 20-page catalog, issued by Societe Genevoise D'Instruments de Physique and issued through their American agents, Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y., describes the No. 4B and 5B sizes jig boring machines made by this firm. The catalog explains the use of these machines in jig, die, mould, and tool making, and describes the various parts of the machine in detail. Accessory equipment, including the locating microscope, locating dial indicator, boring tool holders, guide bushing support, chucks, and other tools are also described and illustrated. The catalog is profusely illustrated with pictures showing the machines at work on a wide variety of jobs. Copy free upon request.

Over the Editor's Desk

The Next Step

MORE important than anything we could say this month were some of the points made by John W. O'Leary, president of the Machinery & Allied Products Institute, in a recent address before the forum of the Cincinnati Chamber of Commerce. Taking the stand that American industry has done even more than its share to stabilize business and to maintain employment at its highest level, Mr. O'Leary attacked the idea that before the depression we had reached the limit of employment and that production had exceeded our capacity to consume.

In the course of his address Mr. O'Leary said: " . . . the Machinery Institute . . . assembled facts and figures to emphasize the relationship of employment and production. That survey estimated a potential market in machinery and equipment alone of $18,500,000,000 in 58 industries. The building of equipment to facilitate production would provide work for four million workers for a two-year period.

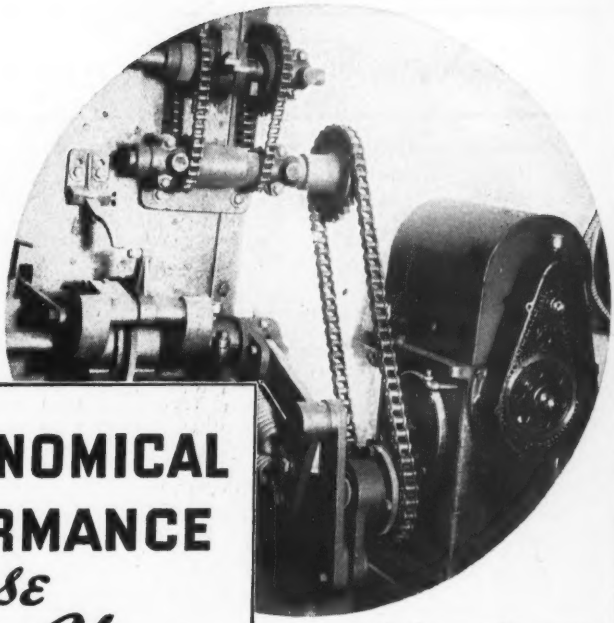
"Compiling the facts which experience had furnished, it is demonstrated that (1) while jobs increase faster than population, there was a gain of 20,000,000 new jobs during the period of most intensive technological development—from 1900 to 1930. (2) Employment is nearest normal in most highly mechanized industries and unemployment greatest in occupations in which machines are used least. (3) Eighteen new industries resulting from machinery development have created millions of new jobs. (4) The progressive evolution of industry creates jobs for three workers while eliminating one. (5) Workers are in greatest demand where most machines are installed. (6) Machinery has raised labor's earning power, thus increasing purchasing power and consequently employment.

"A point often overlooked is that there is an absolute limit beyond which employment does not and need not rise. Employment does not rise above 40 per cent of the poulation; the remaining 60 per cent consists of women, children in school, and the aged who are retired. The level of 400 workers per 1,000 of population was held most of the time between 1910 and 1930, and that level was 50 per cent higher than the level 100 years earlier when only 270 per thousand of population sought employment in periods of normal prosperity.

"Employment today in the steel industry is far above the 1929 average, even though production is far below capacity. From 2,600 pounds per person in 1900 the use of steel in the United States increased to 16,800 pounds in 1935 . . . Science and technology have created jobs, not destroyed them, in this major American industry.

"Telephone operators increased 190,000 while the dial system was being installed . . . Electrical refrigeration popularized all refrigeration and increased ice dealers by more than 100 per cent between 1920 and 1930. Typewriters, dictating machines, adding machines and calculators . . . made possible countless services undreamed of a generation ago and office workers operating these machines increased by more than a million and a half between the last two Federal censuses."

It is very apparent that a determined effort is being made to discover the forces which periodically interrupt the normal workings of commerce and industry and clog the channels of trade, resulting in what we term a "depression". This will be the next important step in the evolution of civilized society.



For ECONOMICAL PERFORMANCE use Roller Chain

The Perfection stoker uses Baldwin-Duckworth triple width roller chain between 1200 R.P.M. electric motor and gear reduction unit. Drive shaft is operated by single roller chains.

To operate economically, this stoker must receive a steady, uninterrupted flow of power. And Baldwin-Duckworth roller chain furnishes the strength and dependability demanded by the job. The multiple strand chain operates on short centers at high speeds—while the single strand chain withstands the slow, heavy drag of the stoker mechanism.

Wherever economy depends upon trouble-free power delivery—use Baldwin-Duckworth precision machined roller chain. Rugged and accurate, it gives longer life with fewer repairs.

Send for a copy of our catalog. It shows all types of roller chains and accurate cut sprockets. Baldwin-Duckworth Chain Corporation, Springfield, Mass.

BALDWIN—DUCKWORTH

New Shop Equipment

Farrel-Sykes Gear Generating Machine

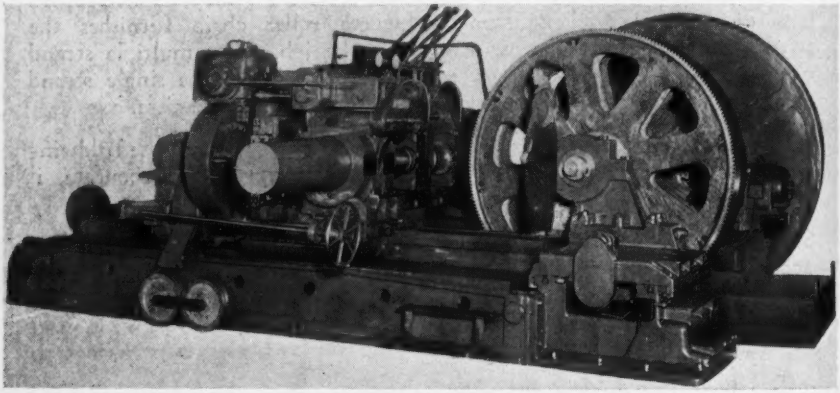
The illustration shows a Farrel-Sykes gear generator which is one of two machines that have been built by the Farrel-Birmingham Company, Inc., 44 Main St., Ansonia, Conn., for the Russian government. The machine has capacity for cutting gears up to 8 meters (approximately 26 ft.) with a maximum face width of 1½ meters (approximately 5 ft.) and a maximum pitch of 50 module (6.18 in. circular pitch). These machines represent the latest development in the Farrel-Sykes gear cutting machines and the design incorporates many recent developments which have been developed to obtain greater precision and facility of operation.

The machine shown is capable of cutting practically every known type of gear that operates on parallel axes, including straight tooth gears, single helical gears, double helical or herringbone gears made either with continuous teeth or with a wide or narrow gap between the right and left hand helices. In addition, it will cut internal gears with either straight or helical teeth.

Besides the large diameter capacity, the machine is capable of cutting pinions of small diameter without additional attachments. The hole in the main spindle is more than 30-in. diameter so that pinions made integral with shafts can be cut by passing one end of the shaft through the hole in the spindle and the other end through the outer support bearing, which has a diameter of slightly more than 32 in. The total weight of the 8 meter machine is approximately 265,000 lbs. The weight of the spindle carrying the cutter operating and controlling mechanism is slightly over 35 tons. The total gross weight of the machine is 295,000 lbs. and the overall dimensions are approximately 38x 26 feet.

Power is supplied through five motors, the 40 h.p. main driving motor being mounted on the main saddle of the machine to avoid necessity for long driving shafts. A 10 h.p. motor rotates the work and the main spindle during the setting up operation. The quick traverse for the main saddle is powered by a 5 h.p. motor. The outer work support is too heavy to move conveniently by hand, consequently a 1 h.p. motor is provided for this task. A 3 h.p. motor drives the two coolant pumps.

The electrical control equipment is designed especially for convenience of operation. There are push buttons for starting, stopping and jogging the machine, as well as for varying the speed of the main motor. Included with the



One of two large Farrel-Sykes Gear Generating Machines recently built for Soviet Russia. This machine will cut gears weighing up to 50 tons, up to 26-ft. diameter, 5-ft. face width and over 6-in. circular pitch.

equipment is a tachometer dial which shows the cutting speed and the number of hours the machine has been operated. Current consumed is registered on an ammeter. Other buttons control the coolant pump and the movement of the saddle on the machine bed. A red light glows automatically if the coolant supply fails. Limit switches prevent overtraverse of the main saddle and of the outer work support.

The tools used in this machine are probably the largest gear generating tools made thus far. The finer pitch tool weighs 140 lbs. and the largest approximately 400 lbs. It is expected that these machines will be used for cutting gears weighing as much as 50 tons.

Whitney No. 37 Universal Abrasive Cutting-Off Machine

An abrasive cutting-off machine which has a wide range of applications for cutting light materials and both solid and metal forms has been brought out by Whitney Metal Tool Co., 102 Mill St., Rockford, Ill. The machine is especially intended for cutting tubing, moulding, angles, light channels, and hollow shapes that are made from thin metal, but it will also cut hard metals, both solid and hollow, that cannot be cut with any other method. The machine is said to be also adapted for cutting glass, porcelain, stone and plastic materials.

The cutting-off wheel is 10 in. in diameter by 3/32 in. thick and is mounted on a spindle which runs in precision type ball bearings of ample size, well protected against the entry of abrasive and foreign materials. The wheel is driven by a wheel guard V-belt from a 1 h. p. motor, the motor and wheel head mechanism forming an integral unit. An adjustable spring counterbalances the unit and returns it to its "rest" position.

In operation, the cutting-off wheel swings forward and down from a point of radius that is about 45 deg. from the horizontal. Thus the abrasive wheel penetrates the work without cutting through a flat surface, avoiding burning. Any mitre can be cut by adjusting the wheel head radially on the column to the desired angle, this universal feature making it possible to cut angles without swinging the material. Thus long pieces of work can be cut without utilizing too much working space.

The cabinet base is a one-piece casting of ribbed, ball type construction. The wheel head and motor form a unit with adjustable hardened and ground tapered bearings for the feed in action. A hand

screw clamp is provided for locking in the desired position. The universal angle vise is supported by a water-tight tub shaped casting having a machined surface. The vise can quickly be replaced with special fixtures to accommodate special shapes, angles, or materials.

The vise is of unique design, being so built that the pressure against the work is aided by spring tension, which provides an equal pressure that will not

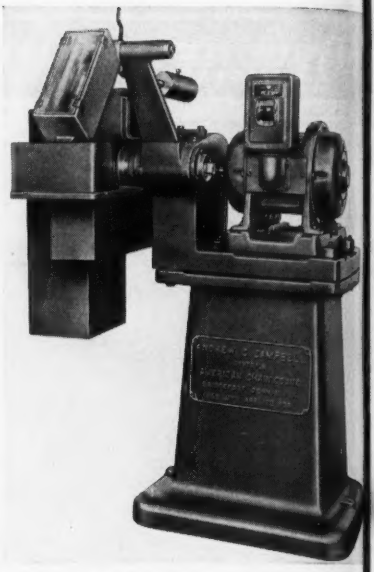
Whitney No. 37 Universal Abrasive Cutting-Off Machine

mar or damage thin shapes and tubing. This pressure is adjustable by screwing the ball handle to right or left and the jaws are opened and closed by an upward or downward movement of the same handle. The vise is mounted on an accurately machined table located with a tongue block and key way which permits sliding the entire unit to right or left from the center. The upper portion of the vise is mounted on a cradle which permits a tilting action.

The motor is 1 h. p., 3425 r. p. m. Spindle speed, 4800 r. p. m. Height, floor to vise, 39 in. Shipping weight, 500 lbs.

Campbell No. 0 Wet Abrasive Crib Cutter

An abrasive cutting machine developed to fill the need for a smaller unit for the cutting of many materials accurately, quickly and economically, to be known as the No. 0 Tool Crib Cutter, has been announced by Andrew C. Campbell Division of American Chain Company, Inc., Bridgeport, Conn. The machine is particularly adaptable for handling the numerous cutting jobs which are included in tool crib work, and light production jobs can also be cut as required



Campbell No. 0 Wet Abrasive Tool Crib Cutt

quickly and economically.

The No. 0 machine will cut practicall all types of material in solid bars up t 5/8-in. square or round and tubing u to 1¼-in. diameter. In addition to th ordinary metals, the machine will cu high speed steels, porcelain, and othe materials. Hardened steel can be cu without discoloration or drawing th temper. The machine can be used eithe wet or dry, the coolant being handle without the use of a pump.

The cutting is done by a revolvin thin abrasive disk which picks up th proper amount of coolant from the coo ant tank. The spindle is equipped wit

especially selected ball bearings which are loaded with lubricant and sealed so that additional lubrication is unnecessary. The sealed construction prevents dirt and moisture from getting into the bearings. The spindle is mounted in a rigid semi-steel casting and power is transmitted through a chain drive which is fully enclosed, provision being made for a sufficient supply of oil to keep the chain lubricated under all conditions. The motor is mounted on a standard sliding base which can be adjusted as required.

The coolant tank is provided with an adjustable float chamber by which the level of the coolant in the tank can be regulated to maintain the level of the coolant at any point desired. Material to be cut is held by a V-type holder mounted on an arm which swings from the top of the machine. The material is placed in this holder with one end against an adjustable stop and the holder is then fed against the cutting disk by hand. An extra heavy glass window in the guard permits the operator to observe the operation.

Material holder extensions can be provided in multiples of 2, 4, 6 and 8 ft. for use on either or both sides of the cutting disk. The extensions are carried by an oscillating shaft which obtains i initial motion from the material hold swing frame.

Cutting disks up to 12-in. diamet 1/16 to ⅛ in. thick can be used. Th flanges on the spindle are 4-in. diamete The motor is 1 or 1½ h. p. ball bearin type and the spindle speed is approxi mately 1800 r. p. m. Height of machin 46 in.; floor space required, 30 x 31 in net weight, 410 pounds.

Toledo Knuckle Joint Coining Pre

The line of Knuckle Joint Press made by the Toledo Machine & To Company, a division of E. W. Bliss Com pany, 1420 Hastings St., Toledo Ohi for the sizing or cold finishing of forgin and other coining, extruding, swagi and cold squeezing operations has be augmented by the addition of a 150-to tie-rod frame press, illustrated herewit The press is made in capacities from tons up to 2500 tons, the press show in the illustration being the smallest this type.

The features of the new press inclu the rolling key clutch, the tie-rod fra construction, and a number of refin ments in details of design and constru tion. The uprights, crown and bed a

The *New* Wahlstrom

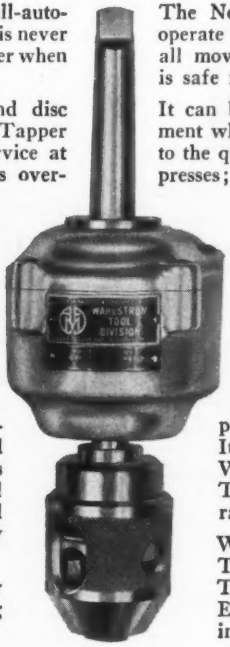
FULL AUTOMATIC TAPPER

A distinct departure—a full-automatic tapper, because the tap is never in reverse and always in power when starting to tap.

Free from friction cones and disc plates, the New Wahlstrom Tapper will give you continuous service at maximum size tapping; thus overheating is avoided and the breakage of taps in the work reduced practically to nil.

Its safety throw-out metal clutch, which will last for the life of the tapper, is so sensitive in operation that the operator can "feel" the work; when the tap meets greater than tapping pressure (chip clogged holes, etc.) the tap remains stationary in the hole until released by a slight upward pressure which automatically operates the reverse clutch.

The New Wahlstrom Tapper is a REAL help in reducing salvage costs!



The New Wahlstrom Tapper will operate efficiently in any position, as all moving parts move in oil; and is safe for bottom tapping.

It can be supplied with an attachment which permits it to be fastened to the quill of small bench type drill presses; it is also used as an adapter in conjunction with Black & Decker, Van Dorn and Stanley 1/4" and 5/16" electric drills, making a safe, compact, modern hand tapper.

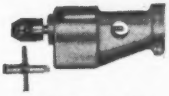
As a Portable Bench or Wall Type Tapper, it is light, compact and can be easily moved from place to place to suit production needs. It takes only three of the New Wahlstrom Full Automatic Tappers to cover the size range from 2/56" to a 1" tap.

Write for literature on the New Tapper, the Portable Bench Type Tapper, the Adapter for Electric Drills and other tools in the Wahlstrom Line.

Wahlstrom Tool Division
American Machine & Foundry Co.
5502-5524 Second Ave., Brooklyn, N.Y.

PORTABLE BENCH TYPE

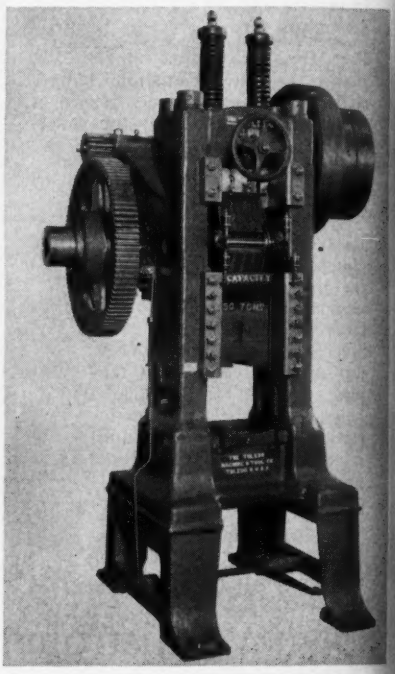
SHOWING ATTACHMENT FOR DRILL PRESSES



ADAPTER FOR ELECTRIC DRILLS

made of high tensile strength, pearlitic alloy castings and are held together by steel "shrunk-in" tie-rods. Previously this press was built with a solid frame but the greatly increased advantage of the tie-rod construction created the demand for the change-over.

The ability of the rods to stretch, in case of a heavy blank or other mishap gives a needed measure of protection.

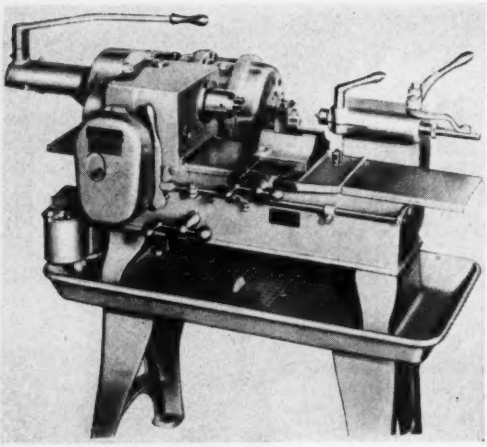


Toledo Knuckle Joint Coining Press

Many of the smaller sizes are carried in stock and can be shipped on receipt of order. The operating speed of the geared press shown is regularly 43 strokes per minute.

High Speed Headstock for Porter-Cable 9-In. Manufacturing Lathes

To facilitate the rapid turning, facing and boring of small precision parts such as valves, pistons, pulleys, and so on, the Porter-Cable Machine Co., Syracuse, N. Y., has developed a high speed headstock for use with the 9-in. manufacturing lathe made by this firm. The spindle



High Speed Headstock for Porter-Cable 9-In. Manufacturing Lathe

is mounted on precision, high speed, preloaded ball bearings, provided with force feed lubrication. Headstock bearings are mounted by a method that allows the rear bearing to float and thus compensate for the varying lengths of bearing centers, due to temperature changes. Multiple V-belts drive the spindle unit which is mounted on an adjustable bracket at the rear of the bed. To eliminate the possibility of motor vibration being transmitted to the spindle, the motor is insulated from metal to metal contact and is suspended by vulcanized rubber mounting.

The spindle is sturdily constructed but hollow, allowing for the use of air cylinders or mechanically operated chuck closers. Various spindle speeds up to 3600 r. p. m. are obtainable by the use of different size motor pulleys or various speed motors. The clutch is eliminated, the spindle operating direct from the motor and controlled by a switch. The switch may be of the reversing type and a brake type motor may be used if desired.

Constant feed ratio per revolution of spindle is assured by driving the feed pick-off gears by V-belt from the spindle. Feeds from 0.0005 to 0.010 in. may be obtained by means of pick-off gears and the back facing attachment may be used in conjunction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HARTFORD
CONNECTICUT, U. S. A.

with the front carriage if desired. T lathe will swing 9 in. diameter and in. between centers. Motors can be u up to 2 h. p.

The machine is especially suitable f second operation work with tungs carbide or diamond tools. Due to r angle drive, the lathe will occupy l little floor space. It is capable of an e tremely wide range of multiple tool on both the front carriage and fac attachment, and is adaptable to eith chucking or center work.

Hisey-Wolf Heavy Duty Textr Snagging Grinder

The Hisey-Wolf Machine Co., 2 Colerain Ave., Cincinnati, Ohio, brought out a line of Heavy Duty T drive Snagging Grinders made in f sizes—5, 7½, 10 and 15 h. p.—and in different types comprising single spi grinders, multiple-speed grinders, two spindle grinders with one or m speeds. The machines are designed proportioned throughout for the m severe duty, with weight scientific distributed to minimize vibration. Wh guards and mounting brackets are steel as are also the hinged covers chip breakers. Guards can be adju to the wear of the wheels. Work s ports have horizontal and vertical justments and are extra heavy.

The two motor, two spindle grin is most efficient in that the speed either spindle can be changed indepe ently according to the size of the wh On single spindle machines with m speed drive, the size of the larger w naturally determines the operating s for reasons of safety. All multi-sp machines are equipped with safety vices so that the wheels must oper at the proper speeds. Speeds are ch

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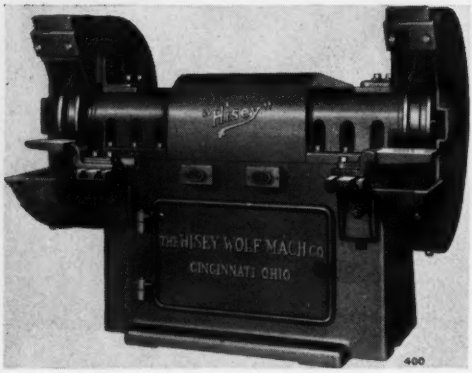


Hisey-Wolf Heavy Duty Texdrive Snagging Grinder

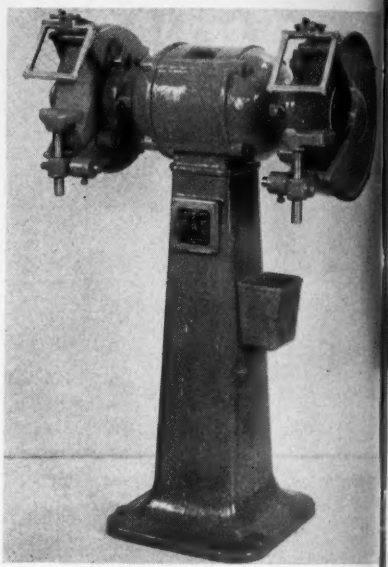
ed by shifting the belts from one set of sheaves to another.

The Hisey system of wheel transfer is used, which employs groups of single speed grinders arranged in sets for different size wheels. Thus when the new wheels on one machine are worn down to a certain smaller size, they a transferred to another machi which has guards and is speede according to the smaller diamet of the wheels. When these whe are worn down to a still small size, they are again transferred t a third machine which operat at the higher speeds required f the smaller wheels. Thus wheels throughout their entire li have operated at their most ef cient and economical speeds. T wheel flanges are accurately ma chined all over and are careful balanced. Wheels are clamp close to the hole by means of s hardened socket head cap screw The entire assembly of wheel a flanges can be removed for tran fer as an integral unit.

The motor is solidly mounted four points with provision for be adjustment. Although regularly supplie with motor, the grinders can be furnishe without motor and with base for accom modating any size and type of moto Spindle speeds can always be furnishe to suit, regardless of motor characteri tics.

Clark 2 H. P. Grinder

The 2 h.p. grinder shown in the illustration is the latest addition to the line of grinders made by the Jas. Clark, Jr., Electric Company, Louisville, Ky. The grinder is equipped with push button control with overload protection, enclosed safety guards, adjustment for wheel wear, and non-shatterable glass eye shields, tool rest, adjustable both horizontally and vertically, water pot, two 12x2-in. face and 1-in. hole grinding wheels. An optional feature on the grinder is the exhaust opening at the bottom of the wheel guards.

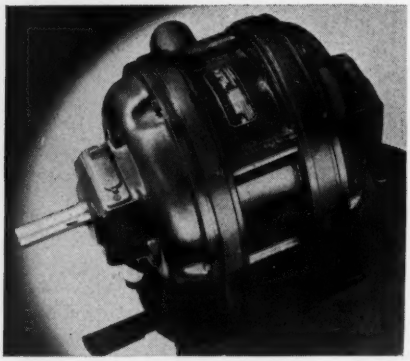


Clark 2 H. P. Grinder

The motor is totally enclosed, the rotor shaft being mounted in heavy duty precision ball type bearings, grease lubricated and sealed against grit and dirt. The motor is rated at 2 h.p. for continuous duty at 1750 r.p.m. with a 55 deg. Centigrade rise, and will stand a momentary overload of 100 per cent. The motor frame is of small diameter, permitting maximum wheel wear and maximum clearance for work. All unnecessary and awkward brackets have been removed, giving the machine a very trim and compact appearance. The weight of the grinder is 445 lbs. net. Shipping weight, 535 pounds.

G-E Polyphase Induction Motor

A new design of riveted-frame squirrel-cage polyphase induction motors, in frame sizes of from one to fifteen horsepower at 1,800 r. p. m., has recently been placed on the market by the General Electric Company, Schenectady, N. Y. The new motors, available in a variety of electrical and mechanical modifications, incorporate improvements in stator-coil insulation, frame construction, and other design features.



Open Horizontal Sleeve Bearing General-Purpose Squirrel-Cage Induction Motor

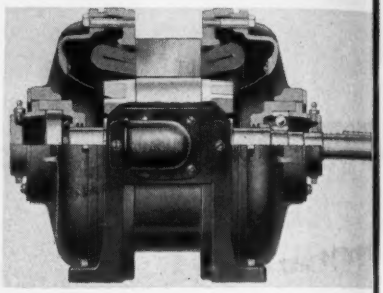
Co-ordination of design permits the different modifications of motors in the line to be used interchangeably for many types of power supplies and for various applications requiring open, sleeve, or ball-bearing, enclosed fan cooled, splash-proof, vertical motors, etc. As a result of this adaptability, many special requirements may be met with the standard available line.

A new insulation system "built from the inside out" is employed for the stator-coil windings, which are of the random-wound type, with joints at the connections fused instead of soldered. Recently developed insulating materials and processes are utilized, eliminating the need for taping the end windings and producing an insulation assembly with high resistance to moisture and other common deleterious influences, such as mild acids, alkalis, oil, and abrasion.

A new riveted-frame construction and new end frames made of malleable iron, with integrally cast feet, contribute to the strength and rigidity of the motors, providing increased resistance to vibrat-

ing and shock loads. Cast-iron end and shields of ample strength maintain accurate bearing alignment and uniform air gap.

Convenient features include: two-part conduit boxes that provide ready access to leads and can be mounted in any one of four positions; handy knock-off ledges on end shields, permitting easy disassembly with ordinary tools; adequate wrench room for removing end-shield cap screws; ball bearings provided



Cutaway View of G. E. Open Ball Bearing Riveted Frame Squirrel-Cage Polyphase Induction Motor

with pressure grease fitting and relief plug; sleeve bearings equipped with oil-filler gauge that can be placed on either side of housing; and general simplicity and accessibility of all parts.

Chambersburg "United" Steam-Hydraulic Forging Press

Heavy forgings are said to be forged quickly and economically to a close degree of accuracy by the use of the high speed steel hydraulic forging press recently added to the line of the Chambersburg Engineering Company, Chambersburg, Pa. The press is built in two general styles; the single frame and the four-column models. Both types embody the same principles and application, the difference being only in capacity and physical features. The essential elements are the press, the steel intensifier and the water reservoir or prefiller tank.

Close control of the intensifier or forging stroke is attained though a controlling gear attached to the intensifier which operates to close the steam valve at a point of the intensifier stroke corresponding to the position of the hand lever. Thus a slow movement of the hand lever results in a corresponding slow squeeze of the press and stopping

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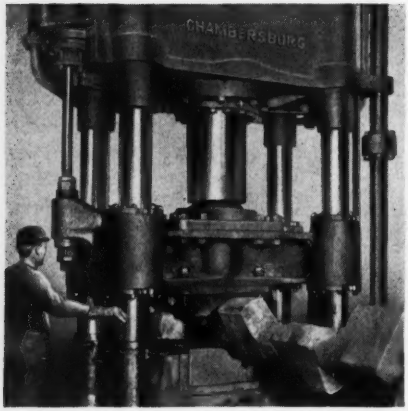


Chambersburg "United" Steam-Hydraulic Forging Press

the movement arrests the action of the press completely. This design gives the operator complete control of the action of the machine—which is particularly valuable in cutting off or bending work.

The single frame press is built in 150-ton and 300-ton sizes. This type is particularly suitable for railroad and other repair shops where a variety of bending, forming and forging operations are performed. The four-column model is built as a single cylinder press up to the 1500-ton size and as a duplex ram press from the 2000-ton capacity upwards.

The design of the press enables a special steam saving device which utilizes exhaust steam for useful work at the beginning of the following lifting or pressing stroke and producing a saving in steam consumption. Another valuable feature of the design is the marked increase in speed of operation.

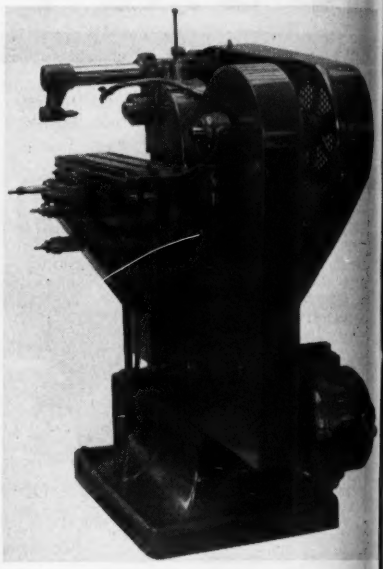
U. S. No. 1 Hand Milling Machine

The United States Machine Tool Co., 1954 West 6th St., Cincinnati, Ohio, has redesigned its No. 1 Hand Milling Machine as shown in the illustration. This machine is particularly adapted to the cutting of any size and all types of light milling operations. The design includes vertical and horizontal feeds, enabling the machine to be used for profiling.

Among the improvements included in the redesigned machine is the heat treated chrome nickel steel spindle. The spindle runs in Timken bearings of ample size, take-up adjustment being provided.

Backshaft boxes are of the standard Fafnir type, and the machine is anti-friction bearing equipped throughout.

The motor is mounted on a swinging bracket, power being transmitted to the spindle through a V-belt drive. Spindle speeds of 147, 242, 356, 656, 1080, and



U. S. No. 1 Hand Milling Machine

1592 revolutions per minute are available with the 1 h. p., 1150 r. p. m. motor. These high spindle speeds enable the efficient use of small end mills.

Grant No. 283 Double-End Automatic Chamfering, Facing and Burring Machine

The Grant Mfg. & Machine Company, 96 Silliman Ave., Bridgeport, Conn., has brought out a double-end automatic chamfering, facing, and burring machine, to be known as the No. 283, which will handle work up to 2½-in. diameter and from ¾ to 6 in. long inclusive. The machine as shown is set up for finishing both sizes of 1¼-in. nuts. A magazine type feed is used, which, after the nuts have been placed in the magazine by the operator, allows them to fall by gravity into feed fingers. At this point they are automatically pushed into position by the clamping jaws, are auto-

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A material, so highly refined to dovetail with economy in your production and quality in your output, is bound to develop higher efficiency in your operations and promote your profits.

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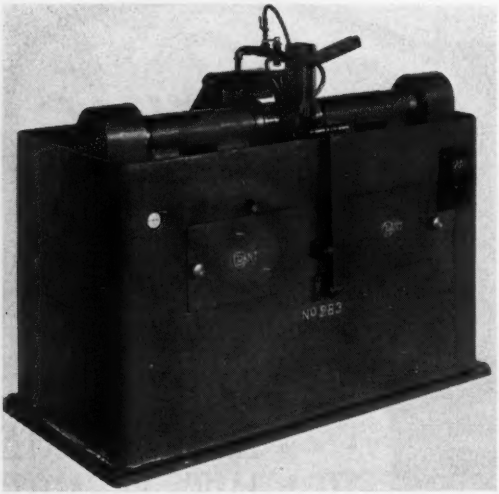


Grant No. 283 Double-End Automatic Chamfering, Facing and Burring Machine

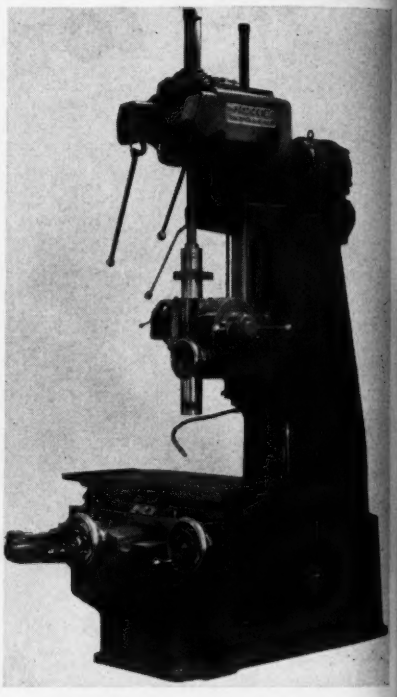
matically clamped, the machine operations performed, and the finished parts automatically ejected.

The spindles are of chrome-nickel steel, heat treated, and run in bronze bearings which are each more than 16 in. long. Fine adjustments are provided for spindle movements, also cam adjustments for the spindle. The cams are of the drum type with removable plates. A safety device is provided on the cam shaft to prevent breakage. Change gears provide for a variety of spindle feeds and speeds. Power is transmitted from the motor to the spindles through silent chain drive. Provision is made at the front of the machine for a crank handle, which is used in setting tools. All bearings are automatically oiled with a forced feed lubricator.

The machine has been designed to afford the maximum of accessibility for convenience in making adjustments. All parts are of selected materials and substantial construction, in order to stand up under the continuous wear and hard usage of high production manufacturing.

Fosdick Combination Drilling Machine and Jig Borer

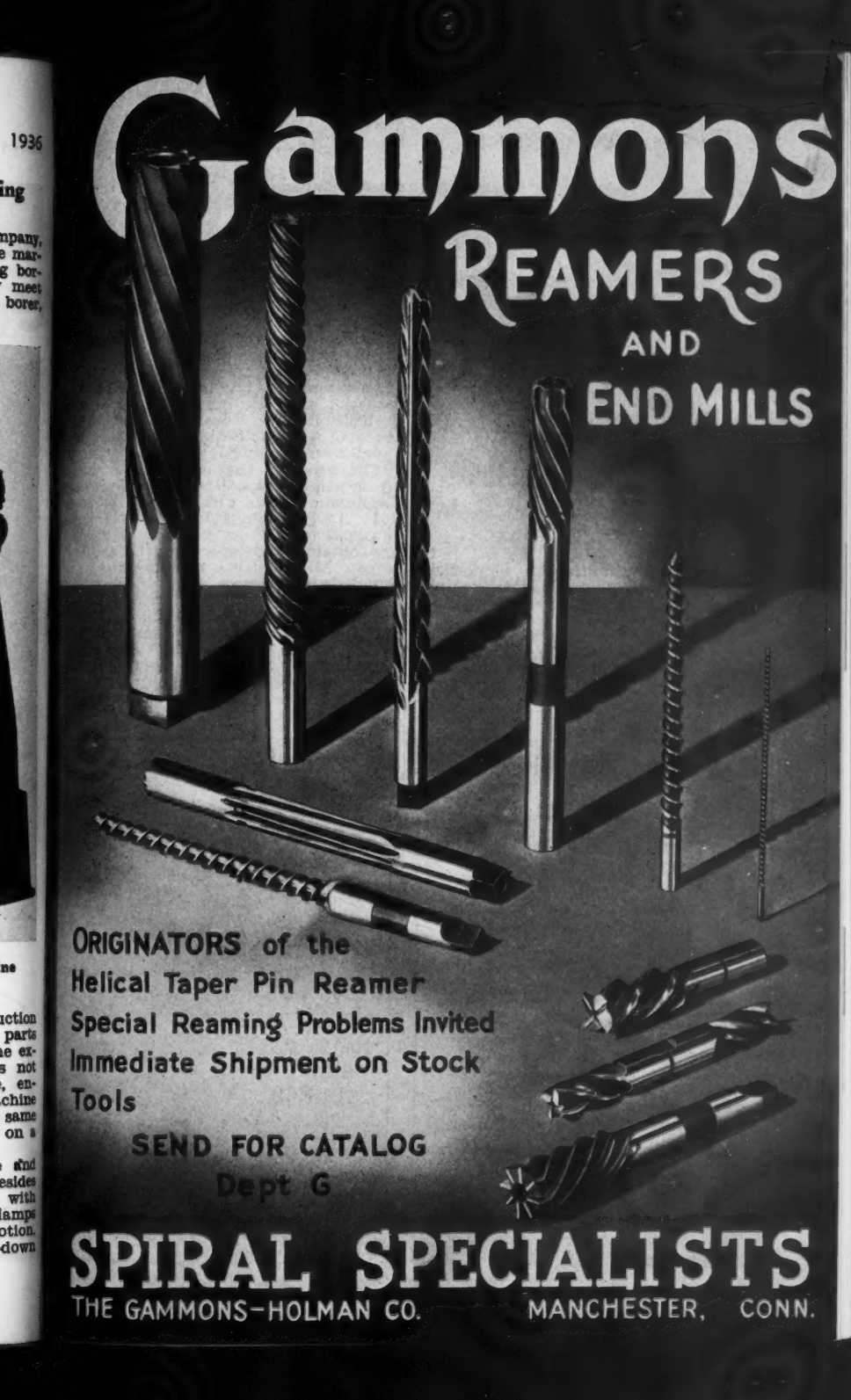
The Fosdick Machine Tool Company, Cincinnati, Ohio, has placed on the market a combination drilling and jig boring machine which will not only meet the average requirements of a jig borer,



Fosdick Combination Drilling Machine and Jig Borer

but may also be used in the production department to reproduce duplicate parts where the quantity is small and the expense of new jigs and fixtures is not warranted. The design is flexible, enabling the user to operate the machine as an efficient drill press and at the same time obtain the accuracy required on a jig borer.

The bearing ways of bed, slide and table are one V and one flat. Besides this bearing, the slide is equipped with two tapered gibs and hold-down clamps to prevent any side or lifting motion. The table is provided with hold-down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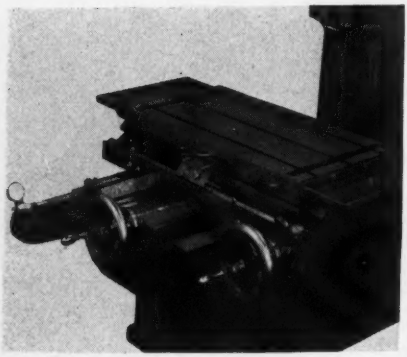


Close view of table on Fosdick Combination Driller and Jig Borer

clamps and these units can be locked tightly and solidly to each other by means of clamps placed directly in front of the operator.

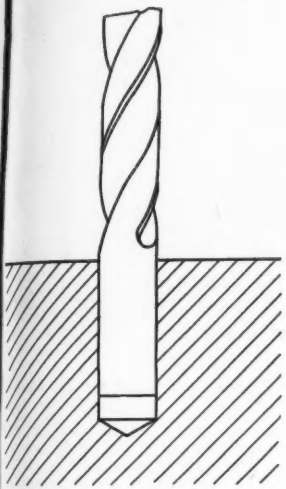
Two large hand wheels at the front of the machine provide for moving the table in and out and for traversing the table crosswise. Each wheel has three positions; one for the high speed, which gives a traverse of ½ in. to one turn of the hand wheel; the other gives 0.050 in. to one turn, and the third is neutral to prevent moving the handle after the table has been set. To obtain these two speeds, the gear boxes are placed on the beds and the slides which are equipped with hardened gears and anti-friction bearings.

To position the table accurately, a 0.0001 indicator is used together with accurate measuring rods and a 0.0001 in. micrometer. The bed is of solid construction and is built on three-point suspension. The sides and all operating parts of the table and slide are lubricated from a central position.

The drive to the spindle is obtained by means of a gear box which provides 12 spindle speeds with a range of 60 to 1500 r. p. m. and 9 feeds with a range of 0.0025 to 0.020 in. All of these changes are obtained by operation of a single lever. All gears are of alloy steel and run in anti-friction bearings which are force lubricated. Forward and reverse of the spindle are controlled by a single lever which operates a multiple disk clutch. The head has an exceptionally long bearing on the upright.

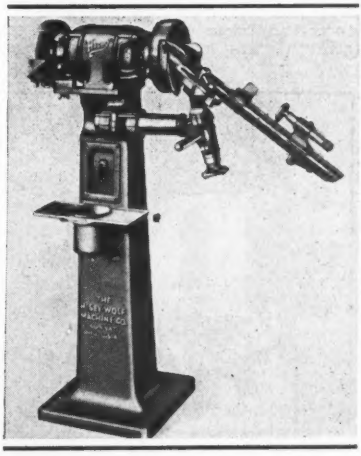
The spindle operates in pre-loaded, super-precision bearings and the spindle

MAKE THIS TEST!



Drill a hole with a twist drill you have ground in your regular manner — THEN try the shank in the hole just drilled. If it makes a snug fit, just turn the page and forget all about this. But, if the fit is sloppy, consider a Twist Drill Grinder.

Hisey Twist Drill Grinders are made in bench and floor stand types in four sizes—⅜, ⅞, 1¼ and 2½ inch capacity. The two larger sizes are adjustable for grinding any desired point and clearance angle. They will grind straight or taper shank drills with 2, 3 or 4 flutes; also, chucking drills and flat or flat twisted drills and drills with oversize shanks. Their low cost will surprise you!



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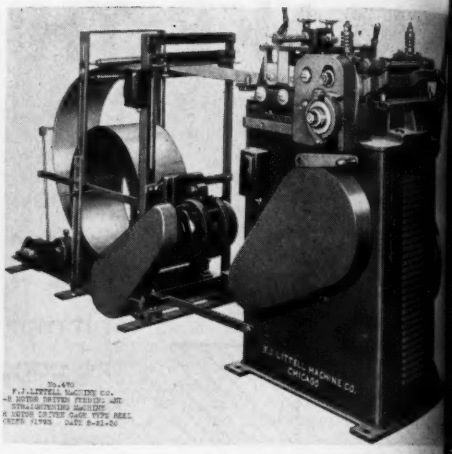
nose is equipped with interchangeable collets having either No. 1, 2, 3 or 4 Morse taper. A direct reading depth gage for drilling is provided and a measuring device is furnished for accurate spot facing or counterboring. The distance from the spindle to the top of the table is 24 in. Capacity of the machine is 15 in. from spindle to face of column; table has a movement of 15x30 inches.

Littell Coiled Stock Feeding and Straightening Machine

In order to provide a practical method of feeding coiled stock to double action presses, either of the cam or toggle type, the F. J. Littell Machine Company, 4127 Ravenswood Ave., Chicago, Ill., has placed on the market the No. 5-B Feeding and Straightening Machine illustrated herewith.

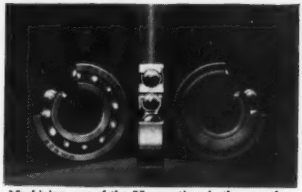


Littell Coiled Stock Feeding and Straightening Mach

The machine is so arranged that it will feed the required amount of stock into the press each time it is tripped, straightening the stock at the same time. An intermittent feeding u which can be tripped by the opera is usually used to a distinct advanta With the feeding unit illustrated, operator trips the unit with his

. . . down your friction losses

The life of your machinery and your power transmission equipment depends in large measure on the quality of the anti-friction bearings used. Fafnir Ball Bearings, made from tough, special-formula steel, are machined, ground and polished to exceedingly close tolerances. To the user, Fafnir's accurate deep-race contours and surfaces mean few replacements and low maintenance costs—for the meticulous attention to detail so characteristic of Fafnir workmanship pays extra dividends in the long run.



Machining, one of the 77 operations in the manufacture of Fafnir Ball Bearings, of which the Grease-Shield Bearing is a representative type.

The correct ball bearing for each job will do more than any one other thing to minimize power losses in machinery. The right Fafnir makes possible full utilization of the productive capacity of plant or machine. Fafnir engineers, with a quarter century of service behind them, will help you to select this right type. . . . The Fafnir Bearing Company, *New Britain, Connecticut.* . . . Atlanta . . . Chicago . . . Cleveland . . . Dallas . . . Detroit . . . Kansas City . . . Los Angeles . . . New York . . . Philadelphia . . . Seattle.

FAFNIR

BALL BEARINGS

hand. The strip is fed forward quickly, the press is tripped, and the operator removes the work-piece from the die. It is said that by using this feeding and straightening outfit an operator can increase production from 50 to 100 per cent, and finished parts can be produced without marring.

The machine is motor driven, the clutch being similar to that used on the ordinary punch press so that it makes only one revolution when it is tripped. The motor is mounted on a rigid welded steel base.

The feeding machine is equipped with a five or seven roll straightener which is not usually power driven. The type of straightener required depends upon the width and thickness of material. A power driven stock reel is used so that a loop in the material can be formed to aid in feeding the material into the machine. The reel is equipped with an automatic shut-off to prevent the loop from getting too large. Either a cradle type or an automatic centering type of reel can be used, depending upon the weight of the coils.

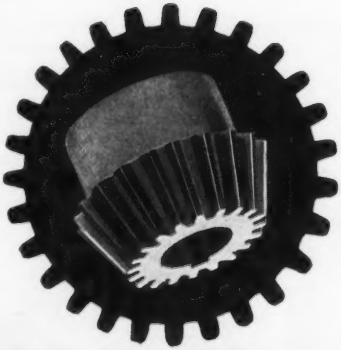
The machine is of sturdy construction, designed to withstand hard usage under modern manufacturing conditions.

Mid-West Hydro-Pierce Unit

Any number of holes can be pierced simultaneously in work of any size and practically any shape by the use of Hydro-Pierce units which have been developed by the Mid-West Production Engineering Co., Inc., 1010 Hofmann Bldg., Detroit, Mich. The unit consists of the hydraulic cylinder, piston, shaft and sliding head, and may be mounted on any type of fixture in any position.

Each unit carries one or more punches, a stripper and the necessary stripper springs. Power is supplied from a common feed line which leads from a power plant consisting of a combination of Vickers rapid traverse and feed stroke pumps integral with the motor, the operation of any number of units being controlled by a single valve. The necessary control valves and a tank to hold the oil comprise a part of the power unit.

The illustration shows the use of these units in the construction of a machine built by a large motor car manufacturer for piercing holes in front fenders and radiator shells. With this machine all radiator flange bolt holes, running board holes, and running board skirt holes are pierced through the fender and reinforcements which have already been



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Providence, R. I.
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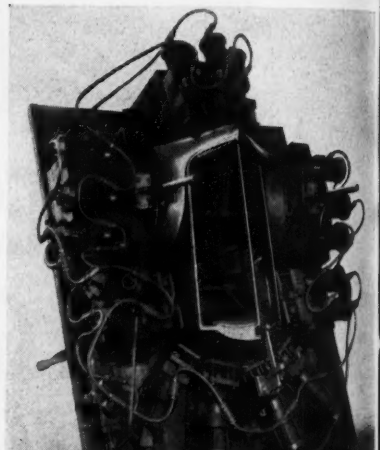
Sodus, N. Y.
Charles E. Crofoot Gear Corp'n, South Easton, Mass.
Arlington Machine Co.
St. Paul, Minn.
Farwell Mfg. Co.
Toledo, Ohio
Diefendorf Gear Corp.
Syracuse, N. Y.
Worcester Gear Works
Worcester, Mass.
Massachusetts Gear & Tool Co., Woburn, Mass.

welded in place. The corresponding holes in the radiator shell, together with other necessary holes are also pierced in the radiator shell, which is done with the reinforcements in place.

The use of such a unit for piercing the holes referred to makes for better workmanship and eliminates unnecessary labor as, by locating the parts in the fixture in the position in which they are applied to the car and clasping them to corresponding flanges, the holes can be pierced in the correct position, assuring a perfect fit in the assembly and eliminating the pulling and hammering which has hitherto been necessary on this operation. The tooling cost compares very favorably with the cost of other tools for performing the same operation and the unit has the further advantage that the Hydro-Pierce units, together with the power plant, may be rearranged for other work or to suit changes in design, thus reducing the tooling cost to the minimum.



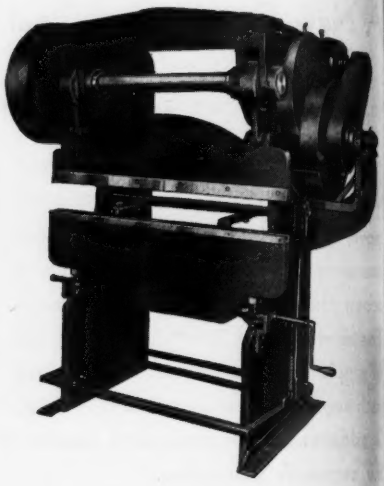
Hydro-Pierce units adapted for piercing holes in automobile front fenders and radiator shells.

Chicago Steel Forming Press

A small powerful press brake designed to handle unusually heavy work for a machine of this size has been brought out by Dreis & Krump Mfg. Co., 7418

Loomis Blvd., Chicago, Ill. The machine is of steel throughout, the materials and workmanship being of the same grade as the larger machines. The bed is built of two plates spaced ¾ in. apart to permit punchings to drop through to the floor.

All bearings are bronze except the eccentrics, which are nickel cast iron. The flywheel runs on Timken roller bearings. A single plate friction clutch is used, built integral with the flywheel and operated by a foot pedal. The brake



Chicago Steel Forming Press

works automatically with the clutch, and the ram can be stopped at any point of the up or down stroke by releasing the treadle. The motor, which is mounted on an adjustable hinged bracket, drives the flywheel by means of V-belts. The motor and V-belts are supplied as standard equipment.

The press is provided with a new type of adjustment which was developed to make alignment of dies as simple as possible. The bed of the press is raised or lowered by large hardened screws at which power is transmitted through a worm and worm gear arrangement. The crank for turning the screws can be used at either side of the press and both ends can be adjusted in unison or separately as desired. Use of the crank at either end of the machine allows the operator to sight the dies accurately

while adjusting the bed. Two adjustable gages are included in the standard equipment. All gears and the flywheel are completely guarded. The Zerk-Alemite System of lubrication is used, a grease gun being furnished with the machine.

Variable speed drive can be furnished for the press if desired. On the standard series press the range can be varied from 17 to 50 strokes per minute and on the heavy duty series the range is from 13 to 39 strokes per minute. When the variable speed drive is used, the operator can set the speed change conveniently by means of the hand wheel screw on the motor base. The speed can be set to allow the press to run continuously at the maximum pace at which the operator can conveniently feed the parts to the machine. The variable speed drive is also a safety feature when making short flanges on long and wide sheets. The stroke can be set a low speed so that the wide sheet will not be thrown up too quickly.

Each series, standard or heavy duty, is supplied in three sizes, the length between housings and length of bed and ram being the same for both types. The heavy duty series, however, has a heavier crankshaft and a larger motor, and the height being slightly greater. Weight of the three machines in the standard series is 2400 lbs., 3150 lbs., and 3900 lbs. The weight of the heavy duty series machines is 3600 lbs., 4400 lbs., and 5150 pounds.

Graham Variable Speed Transmission

A variable speed transmission of new design has been placed on the market by Graham Transmissions, Springfield,

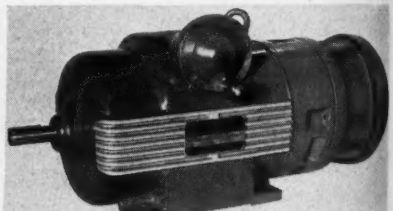


Fig. 1—Graham Transmission with Built-In Motor.

Vt. The transmission, illustrated in Fig. 1, in a compact housing approximately motor size furnishes any desired output speed from one-half motor speed down to zero and reverse. This wide

range of speed is obtained through a single turn of a control wheel.

The unit has only five major parts, is self-contained, and is simple in construction and operation. While using metallic rolling contact instead of belts, it retains the load limiting features of most belt driven units in addition to which it supplies inherent overload protection without damage to the transmission unit or connected equipment.

In operation power is commonly taken from a constant speed motor, the shaft

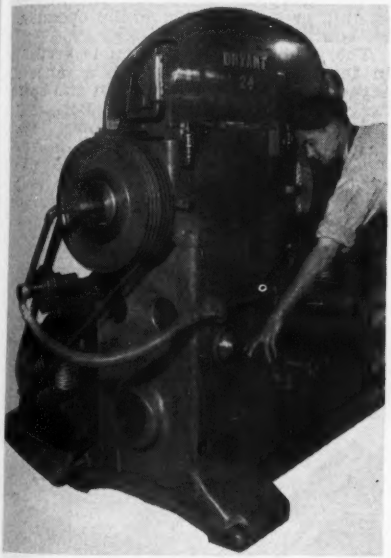


Fig. 2—Graham Transmission applied to work head of a Bryant Grinder, providing suitable work speeds for both rough and finish grinding with the same wheel.

of which is connected to the carrier (1), the latter therefore rotating at motor speed. The carrier supports three taper rollers (2) which are kept in intimate contact under pressure with a non-rotating ring (4) and thus must turn at motor speed times the ratio of ring and roller diameters at the point of contact. The three rollers carry planet pinions which mesh with an integral gear (3), the latter being connected to the output end of the unit, thus providing a step-down ratio combined with speed variation. The variation in speed is obtained by moving the ring (4) along the taper rollers and thus changing the

diameter ratio of these two members. In this way, infinite speed range plus reverse are combined in one unit.

The internal gear in the Graham Transmission is made from a non-metallic material; thus the gear tooth contact is especially quiet. The transmission is bi-directional, operating equally well in either direction of rotation. It can also be driven from the output end, where a slow-running line shaft must supply power at variable speeds to a high speed machine.

The Graham Transmission is available in several combinations. The motor can be built in as shown in Fig. 2, or it may be connected to the transmission by a flexible coupling, motor and unit being retained on a common bed plate. The unit may also be driven from a line shaft or from other sources of power in which case the motor is omitted and a high speed shaft extension provided. The design is such that a geared head can be incorporated at the output end without appreciably increasing the overall length. The geared head provides a reduction up to 7 to 1 or a step-up as high as 1 to 4. With the latter arrangement a top speed as high as twice motor speed can be obtained. With the reduction gearing full motor power can be developed at a top speed of 60 r.p.m. which is especially advantageous for low speed high torque drive.

The design includes a unique "jogging" control which is particularly desirable for cyclic operations where the drive shaft is to be rotated at a pre-selected speed, then rapidly stopped and restarted. The same device is adapted to inching operations of various kinds. Control of the unit is effected without stopping the motor or disturbing the pre-set speed, the driven shaft being brought back automatically to the set operating speed, when the inching, reloading or similar intervening operations are concerned.

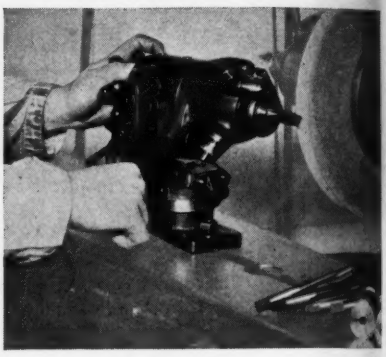
The Graham Transmission is available in three standard sizes with a range of capacity up to 7½ h.p. and in two speed ranges, normal and extreme. Both units are available with or without geared heads. The normal range (4:1) is especially suited for constant horsepower applications, whereas the extreme range unit provides speeds down to zero and reverse.

"Detroit" Tap Chamfering Fixture

A tap chamfering fixture for sharpening any size and type of tap up to and

including 1¼ inches, irrespective of number of flutes or shank length, is announced by Detroit Tap and Tool Company, Detroit, Mich. The use of this type of fixture insures, in the regrinding of taps, that they will be concentric with the shank and also eliminates difficulties in tapping arising from inaccurate flute spacing in regrinding.

Necessity for separate cams for each flute type and each tap with a different number of flutes is elliminated by rotating the tap on an eccentric axis and indexing by means of a finger and registering with the reground flute face. In this manner a balanced relief is assured



"Detroit" Tap Chamfering Fixture

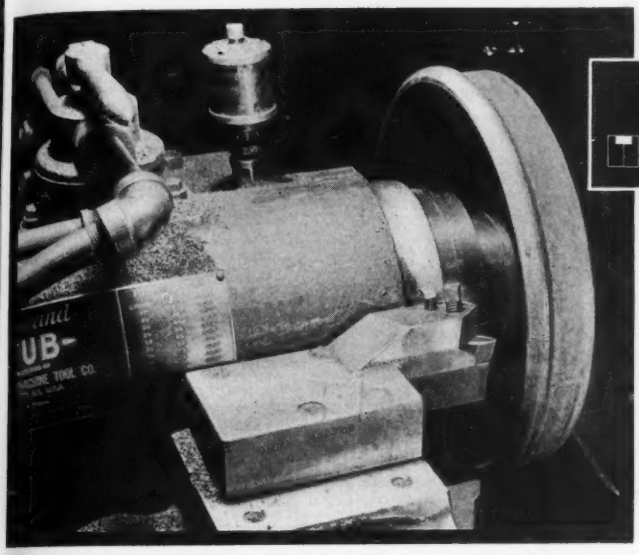
irrespective of flute spacing errors, the method of indexing compensating for such inaccuracies.

Spring collets are used to hold and locate the tap in the fixture. This insures concentricity and eliminates difficulties in sharpening taps on which center holes have been ground away.

Fixtures can be mounted on any type of grinding machine in either a right or left hand position and are adjustable for height.

The amount of eccentricity or relief may be quickly regulated by a graduated adjustment on the fixture. Thus the fixture also enables changing the amount of relief without the use of separate cams.

In grinding, a light pressure of the hand is applied to bring the finger against the stop on the fixture, while rotating the tap by means of the handle. The latter imparts to the tap an oscillating motion. The fixture is completely universal in character permitting the quick sharpening of all taps including taper, plug, and bottoming types.



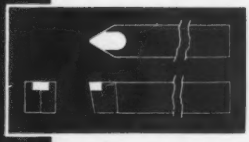


Diagram of tool used in the operation illustrated — Vascoloy-Ramet grade AT for use on hard cast iron in mass production jobs requiring increased pieces per grind.

Finish boring centrifuse brake-drum. Material: the brake surface of the drum is cast iron centrifugally cast into a steel shell. Performance of Vascoloy-Ramet tool:

Speed	Feed	Tool Life
118 R. P. M. 370 Feet Per Minute	.007 Per Revolution	146 Pieces Per Grind

Faster work—done better—at lowered costs! Yet this is only one of thousands of tough jobs in which Vascoloy-Ramet, the new tantalum carbide hard alloy, is daily proving its superiority.

And the grade here used is only one of fifteen grades that cover the complete range of machining needs!

Wherever speed of output must be increased—wherever production costs must be cut—Vascoloy-Ramet is rapidly winning a predominant place.

Unrivalled in the machining of all steel from the softest to the hardest alloy, Vascoloy-Ramet alone is capable of turning steel without "cratering."

On cast iron, semi-steel and non-ferrous materials, its performance is exceptional.

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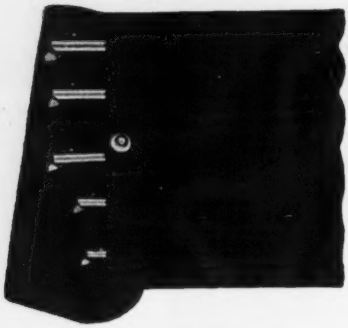
Flynn Boring Bar Set

All classes of small boring can be done with the set of boring bars which has been placed on the market by the Flynn



Flynn Boring Bar Set.

Mfg. Co., 437 Bates St., Detroit, Mich. There are four hardened bars in the set, the diameters being ¼, 5/16, ⅜ and ½ in. The two smaller sizes are 5 in. long and the two larger sizes are 6½ in. long. The bars, with extra high speed steel bits, are packed in a small leatherette case as shown. The three larger bars are of the double-end type with bits placed at 45 and 90 deg. angles, while the ¼-in. bar is of the single-end type with a 45-deg. bit.

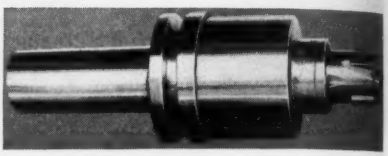
The 90-deg. bits and the 45-deg. bit in the ½-in. bar are held with set screws. The 45-deg. bits in the three smaller bars are held with tapered wedges. Any pressure on the cutting ends of the bits held by the wedges has a tendency to tighten them in their holders. The bits are easily released by driving them forward.

Landis Yoke-Operated Collapsible Tap

A yoke-operated collapsible tap for use on automatic screw machines has been developed by the Landis Machine Company, Waynesboro, Pa.

The tap is a modification of the Landis Style LT Collapsible Tap which has been on the market for a number of years. The tap, as shown by the accompanying illustration, is fitted with two flanges against which a suitable forked-type yoke attached to the machine operates for expanding and collapsing the

chasers. The chasers are collapsed by having a yoke contact the face of the flange near the front or chaser end of the tap upon completion of the desired thread length. The chasers are reset to tapping position by having the second



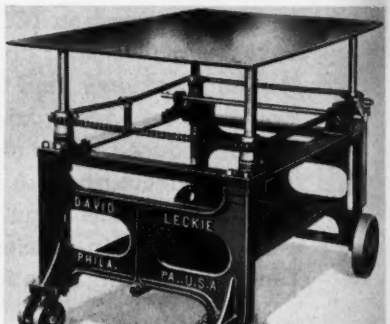
Landis Yoke-Operated Collapsible Tap

yoke contact the flange near the shank upon the return travel of the machine spindle.

The detachable head feature, as used on all Landis Collapsible Taps, whereby several sizes of heads can be applied to the same body, is used with this tap. The tap can be furnished in all sizes ranging from 1⅜ in. to 12 in. It can be used either as a stationary or rotary tap.

Leckie Portable Elevating Truck

The illustration shows an elevating truck which has been especially designed by David Leckie, 624 Race St., Philadelphia, Pa., for use in transporting dies, tools, and other precision work. The



Leckie Portable Elevating Truck

outstanding feature of the truck is that the table can be raised or lowered very quickly. The table is a solid bed ⅝ in. thick, and the elevating mechanism is geared 2 to 1. The crank handle can

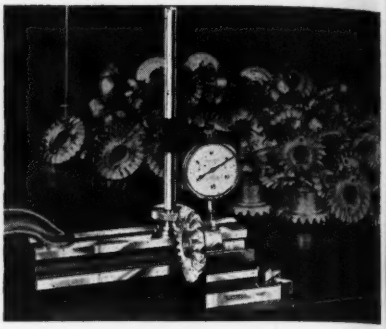
be operated from either side of the truck.

The truck is capable of carrying a load of 1000 lbs. It is made in two standard sizes, a No. 9 with a top 20x30 in. and the No. 10 with a top 30x42 in. The lowest level of the No. 9 is 24 in. and the highest elevation is 37 in. This truck weighs 300 lbs. The lowest level of the No. 10 truck is 25 in. and the highest elevation is 42 in. The No. 10 weighs 400 lbs.

The elevating screws are operated by means of roller chain and are equipped with ball thrust collars to take up thrust. The front wheels are mounted on roller bearings and the swivel casters are equipped with anti-friction bearings. A socket can be supplied by the use of which an electric drill can be adapted to raise or lower the table by power.

Starrett No. 665 Dial Test Indicator

The illustration shows the Starrett No. 665 Dial Test Indicator which has been brought out by The L. S. Starrett Company, Athol, Mass., and the Starrett No. 567 V-Block and Clamp set up to check the hub diameter of bevel gears.



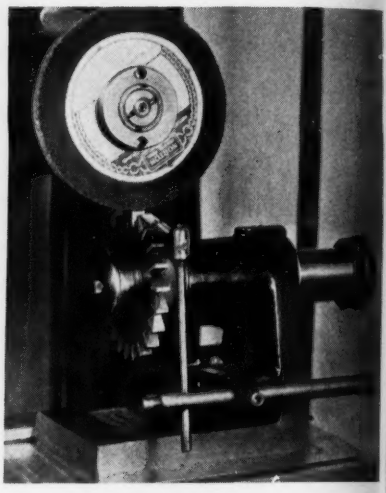
Starrett No. 665 Dial Test Indicator and No. 567 V-Block and Clamp set up to check hub diameters of bevel gears.

The dial test indicator is furnished with a right angle arm for adjustment beyond that which can be obtained with a horizontal arm, and either arm can be removed from the standard for use in the tool post of a lathe. Small blocks which fit into the base provide a guide for checking against the edge of a T-slot or work plate. The indicator can be furnished in a variety of calibrations.

The V-block shown was announced on page 180 of the September, 1936 issue of MODERN MACHINE SHOP.

Little Wonder Grinding Fixture

The illustration shows a fixture designed so that it can be clamped to the V-slot in a grinding machine table or held on a magnetic chuck in order to present the cutter to the wheel at best advantage. The base casting is of semi-steel, square on three sides and with the front on a five degree angle for end mill



Little Wonder Grinding Fixture

grinding. The sliding tube is fully protected at each end with a special felt oil retaining washer preventing dirt or emery from reaching the bearings. All locating stems are case hardened and a lock screw is provided on the spindle for easily setting the stem.

A lock collar is also provided on the rear of the spindle so that, in the event of slip, the cutter will fly away from the grinding wheel and thus will not be damaged. The spindle and bushing are of steel, specially hardened and ground to within a tolerance of plus 0.0001 in. and minus 0.0000 in. The spindle is 1.500-in. diameter with a 1.000-in. hole. The arbor is 1.000 in. with 0.875-in. shoulders. One Brown and Sharpe No. 7 taper sleeve is provided, and sleeves with special shanks can be furnished upon request. Five different sizes of

bushings are provided for handling the different sizes of tools.

To provide a convenient and accurate means for radius dressing the wheels on surface grinders and tool and cutter grinders, this firm has also developed the "Little Wonder Radius Dresser" which consists of a casting with end walls which carry bearings in which a trunnion is swung. At the center of the trunnion is a diamond tool dresser which can be adjusted to produce any desired radius on the grinding wheel as it is swung back and forth underneath the wheel. The dresser is of simple but efficient construction, and can be either clamped to a T-slot or held on the flat surface of a magnetic chuck.

Square D Type T A.C. Automatic Starter

Accessibility for periodic inspection, arrangement of parts for quick replacement, vertical closing action and compactness are the four major features in the design of a new A.C. automatic starter which has been brought out by the Square D Company, Milwaukee, Wis. Magnet assembly, stationary and moving contacts and the thermal relays are replaceable units, arranged so the assembly can be taken apart completely and reassembled in approximately ten minutes.

The starter is known as Type T, Class 8536. It is line-voltage type, can be used to start polyphase, squirrel-cage motors directly across the line, at full voltage where the application permits. Sizes in the present line include units for polyphase motors from 7½ h.p. at 110 volts to 25 h.p. at 440 volts, 550 volts, and 600 volts; units for single-phase motors from 3 h.p. at 110 volts to 7½ h.p. at 220 volts.

Shown in Fig. 2 is assembly of the mechanism in a cabinet on the face of which is a reset button. This button is pressed to reset the magnet - circuit trip after a sustained overload has caused the thermal relays to operate and break this circuit. The cabinet can be opened and the mechanism swung on its hinged support so the interior is clear for wiring. The moving contact assembly can be hinged down, after removing the arcing-chamber covers, to expose the moving contacts and uncover the stationary contacts for inspection or replacement.

The double-break contacts are made of

Fig. 1—Square D Type T A.C. Automatic Starter.

silver and the contact blocks are arranged for addition of auxiliary contacts for electrical interlocking or signal operation. The arc chambers are of the molded insulation with built-in arc suppressors. The magnet core and armature are Parkerized and the magnet is

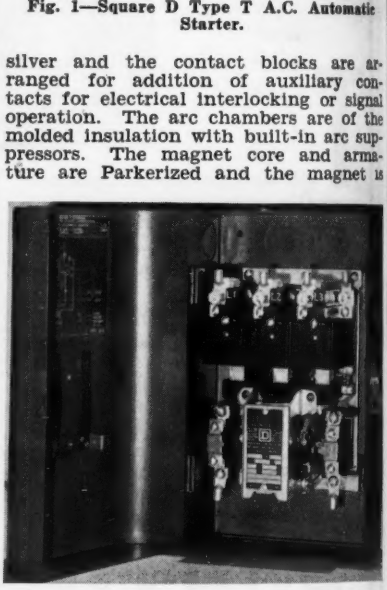


Fig. 2—Cabinet Open, Showing Assembly of Mechanism.

proportioned so it will seal at any voltage at which it will pick up. The movement in closing and opening is vertical for compact arrangement and to prevent mechanical shock from causing accidental closing. The thermal overload

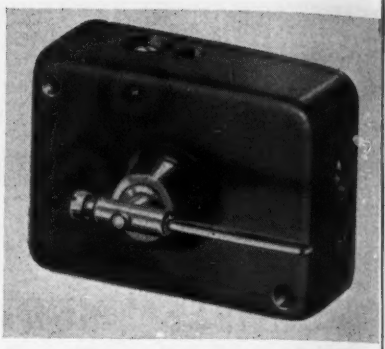
relays employ Nichrome resistance wire, are ratchet type, contain an alloy that melts on a sustained overload to release a magnet-circuit opening latch.

Two or more push button stations, limit switches or other mechanisms can be used with one unit and motor. Two or more units can be interlocked electrically for sequence operation. Liquid level, pressure, heat regulating devices can be applied with the starter in automatic motor control.

Production Type ES-9 Pilot Switch

The Production Instrument Company, 1325 S. Wabash Ave., Chicago, Ill., announces the Type ES-9 Pilot Switch, which is an extremely compact, substantially built, quick acting switch for sensitive control of electrical circuits. Housed in a molded bakelite case, the Type ES-0 measures 1⅝x1⅛x⅝ in. and weighs one ounce. The operating arm is 1 in. long and the operating shaft projects ½ in. from the case. A pressure of ½ ounce on the operating arm is sufficient to operate the switch.

Unusual simplicity is evident in the design of this pilot switch, there being but six parts in addition to the case. Phosphor bronze spring, coin silver contacts, and a bronze shaft bearing are



Production Type ES-0 Pilot Switch. Reproduction in actual size.

features of construction. The switch has been operated for a total of 15 million operations at a speed of 1800 cycles per minute, completing this test with no change in the spring tension, no change in the accuracy of the operation, and with only negligible wear on any of the parts.

The switch may be furnished for a variety of uses and may be arranged to operate right or left hand, open or

closed circuit with reciprocal or rotary motion, and with any position of the lever arm.

Harnischfeger Welding Robot

Harnischfeger Corporation, 4535 W. National Ave., Milwaukee, Wis., announces an automatic welding head which is said to be the first of its kind to use standard coated rods and which will tend to put welding on a mass production basis with uniform high speed pressures. The machine is said to be a

Harnischfeger Welding Robot Used in Connection with Planer.

true robot, operated by remote control. By eliminating the hand operated electrode holder, the machine makes it possible to use a higher current with welding heats as much as 60 per cent higher, increasing tremendously the speed of producing welds.

One of the features of the machine is the fact that standard rods are changed in a "split second", up to 50 standard welding rods being loaded into a magazine and then fed automatically to the welding position. As one electrode is consumed, the remaining butt is rejected and a new full length rod is fed into place. The renewing operation is said to take less than a split second. During this feeding operation the work table stops and starts again automatically as the new electrode makes the electric contact. The action is so swift, however, that no break in the welded bead is evident. The arc length is automatically regulated at a constant point during the welding operation and though the working surface be irregular, there is no ap-

Say, LEAD! One of the largest concerns in the U. S. A. has decided to replace obsolete die heads with R & S "F" heads and R & S chasers over a 3 month period.

R & S "F" HEAD WINS ON MANY COUNTS

Model "F" Die Head is compact, precision built and suitable for practically all types of machines.

Model "FO" Die Head is similar to "F" except that it has greater outside diameter capacity. It cuts short fine pitch threads.

You sure know why, PITCH. They wanted accuracy in threads. They wanted to meet Class 3 Fits in their stride without having a "fit" whenever class 3 was mentioned.

Die Heads come and go, each presenting some new feature, but you will go a long way before you find one that has made and held as many friends as the R. & S. "F" stationary head.

It has made the grade on thousands of machines—its design is time tested—its application is universal. Big shops standardize on it—little shops prize it.

HOW IT WORKS

When the end of the cut is reached, the head snaps open automatically—a ¼ turn of the handles, either manually or automatically, sets it for the next piece. An adjusting ring controls the lateral float to cut as little as 3/32" of thread. The float takes care of any slight camming inaccuracies.

"F" Heads are made in 21 sizes—from ⅜" to 9". Many other styles are available to meet any threading specification.

Let us have your production threading problem.

The RICKERT SHAFER Co.
ERIE, PENNA.

Adjustable Boring Heads; Collapsible Taps
Solid Adjustable Die Heads; Chasers;
Self Opening Die Heads; Solid Adjustable Taps

Tapping Machines, Automatic Cut-off Machines
Automatic, Single Purpose
Threading Machines.

parent variation in the penetration or appearance of the bead.

The machine can be used on flat work

Harnischfeger Welding Robot

or any length, on circular pieces, and, with pantograph attachment, any shape. It is adaptable for use on lathes, planers, rotating tables, boring mills, and with all cranes.

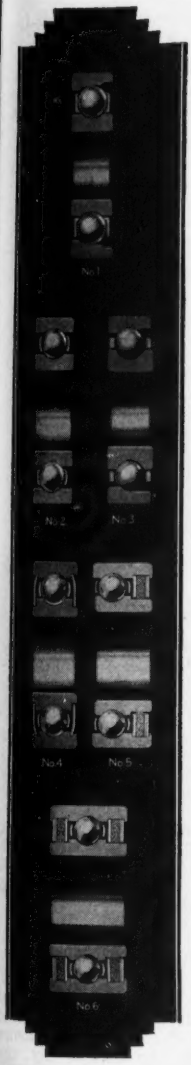
Pyron Metal Application Process

Metal can be "put on" to worn or undersize metal parts at a rate of 0.030 in. per hour by the use of a new method known as the Pyron Process, which is available through the Pyrene Manufacturing Company, 562 Belmont Ave., Newark, N. J. The metal deposit is an alloy of definite controlled crystal structure having an average hardness of 250 Brinnell. At the rate of deposition stated, a large amount of machine parts which would otherwise have to be discarded can be brought up to a size which will permit of refinishing within the space of a working day. The process involves no warping or change in the physical characteristics of the base metal. When applied to steel, the Pyron forms a perfect bond between the base metal and applied metal, thus permitting any kind of machining.

The manufacturer states that a rebuilt part may be carburized and hardened in the usual manner without affecting the bond. The deposit, because of its nature, is also said to provide an exceptional base for any of the standard finishes such as chromium, nickel, copper, brass, and so on.

An interesting feature of the Pyron

"NORMA-HOFFMANN" PRECISION BEARINGS



For PRODUCTION AT LOWER COST

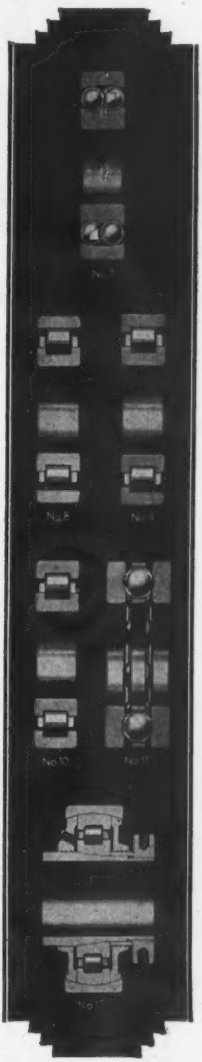
THIS is the objective of every executive, engineer and designer; and the performance of the bearings in a production machine is a vital factor in keeping costs down. * * * * But, in comparing bearings, look beyond first cost—look to the ultimate cost over a period of years. Let proved performance point the way to your decision. * * * * For almost 25 years, in every field of industry, **NORMA-HOFFMANN PRECISION** Bearings have been making distinguished records which command the confidence of those who seek the lower production costs that come with the use of better bearings.

PRECISION BEARINGS

For Every Load, Speed, Duty

NO ONE type of bearing is so versatile in its operating characteristics that it will meet all conditions; the conditions should determine the type of bearings used. From the comprehensive **NORMA-HOFFMANN** line — here illustrated in part and briefly indexed — a **PRECISION** Bearing, or several in combination, can be chosen that will be exactly right for the duty. Let our engineers, with their specialized experience, work with you in selecting and applying bearings that will lower your production costs. Write for the Catalog.

1—Open (separable) type ball bearing.
2—Closed radial type ball bearing.
3—Angular contact ball bearing.
4—Plate (shielded) type ball bearing; available both with one and two grease-retaining, dirt-excluding side plates.
5—"GreaSeal" felt-protected ball bearing with single removable felt seal; available also with single felt seal and plate shield, fully enclosed.
6—"GreaSeal" double felt-protected ball bearing, fully enclosed, with double removable felt seal to exclude dirt and retain lubricant.
7—Double-row self-aligning ball bearing; also furnished with adapter sleeve and nut.
8—Standard cylindrical roller bearing.
9—One-lipped cylindrical roller bearing.
10—Two-lipped cylindrical roller bearing; available also in "full" (cageless) type with retaining rings.
11—Ball thrust bearing.
12—Self-aligning adapter type cylindrical roller bearing, wholly enclosed to exclude dirt and retain lubricant.



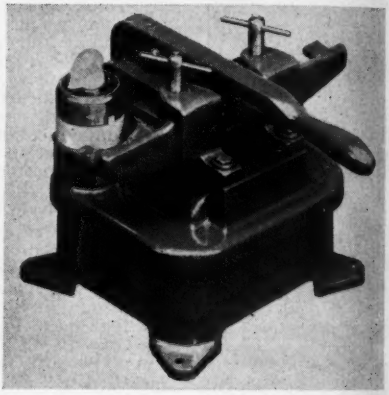
NORMA-HOFFMANN BEARINGS CORP'N. - Stamford, Conn., U.S.A.

Process consists in that the building up can be localized to worn portions such as the ends of shafts or parts of pistons, wrist pins and the like. Economy is said to be an outstanding advantage of the process.

Grob Electric Brazer, Type EB-1, for Band Saws

An electric Brazer for brazing saw bands up to 1½ in. wide is now being manufactured by Grob Brothers, West Allis, Wisconsin.

A transformer is mounted in the base The secondary coil has extensions



Grob Electric Brazer for Band Saws

through the top of the cover which provide for clamping and proper alignment of the saw band ends to be joined. A center clamp for pressing the saw band ends together when brazed is operated with a handle. A switch mounted in convenient reach of the operator is connected with various windings of the primary coil and provides three different heats.

For most satisfactory joints, silver solder and borax flux is recommended. The brazer is made for either 110 or 220 volts, single phase, 60 cycle alternating current. Net weight, 50 pounds.

Model 300 Sound Level Indicator

The Industrial Apparatus Co., 720 N. Wabash Ave., Chicago, Ill., has brought out the sound level indicator illustrated herewith, which is designed to measure sound levels exactly as heard by the human ear. It is said that the user can quickly secure accurate data on sound

Model 300 Sound Level Indicator

and noise levels, thereby reducing testing and manufacturing costs. The unit is particularly recommended for design engineers concerned with noise level reduction work.

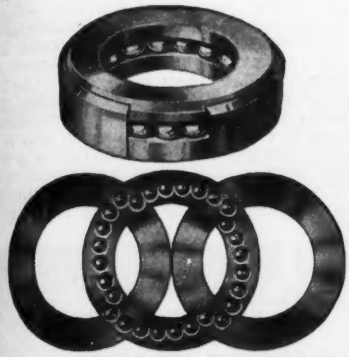
The Model 300 Sound Level Indicator consists of a calibrated crystal-type microphone, an audio frequency amplifier with all-metal tubes, a calibrated attenuator, an ear weighing network, a decibel meter and a crystal-type head set. The range of the indicator is from 30 to 90 decibels, A.S.A. standard. Although designed for A.C. operation, batteries may be used if desired.

To operate, the microphone is placed in the vicinity of the sound to be measured and the calibrated attenuator is adjusted until the pointer of the decibel meter falls within the scale. As both the attenuator and the meter are calibrated in decibels, the sum of these two is the sound level of the sound being studied.

The unit, complete with microphone and head set, weighs only 25 lbs. and is easily carried by means of a handle on top of the case. The cabinet is 12 in. wide by 10 in. high by 8 in. deep. A steel case affords protection for the unit.

Yale and Towne Lift Truck Equipped with Scale

Executives of manufacturing plants where there is a great deal of weighing of raw and finished materials will be in-



BALL THRUST BEARINGS

Special Bearings Made to Order.
Any quantity.
"One Bearing or One Thousand"

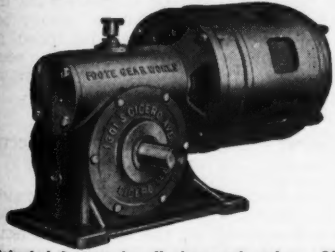
Your present bearings duplicated. Send sketch or worn sample, regardless of condition, for quotation.

Catalog Upon Request

THE GWILLIAM CO.
358 Furman St., Brooklyn, N. Y.

Brad Foote Motorized Speed Reducer WITH 4 Special Features

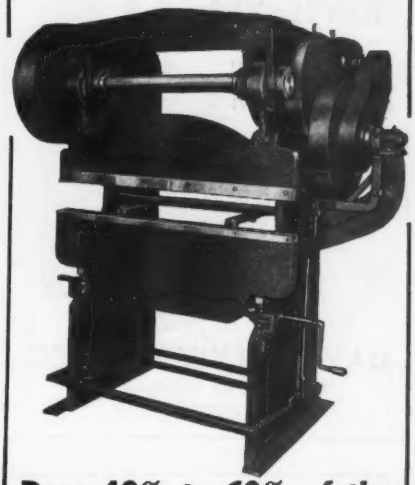
motors may be moved without disturbing underwriters label.



Patented feature in all sizes and styles. Oil cannot enter the motor from reducer housing. Write for new 128 page book of useful data FREE. Ask for book No. 6.

FOOTE GEAR WORKS, INC.
1301 E. CICERO AV., CICERO, ILLINOIS

CHICAGO STEEL PRESS No. 253



Does 40% to 60% of the forming work turned out by the average shop.

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities, up to 10 gauge.

Write for Circular No. 253

DREIS & KRUMP MFG. COMPANY
7418 LOOMIS BLVD.
CHICAGO ILLINOIS

terested in a lift truck equipped with a scale which has been brought out by The Yale & Town Mfg. Co., Philadelphia, Pa. Where a scale equipped hand lift truck is available, the load may be weighed in less than a minute. The lift truck is rolled under the load, the handle is pulled down, a single stroke raises the load from the floor, and it is readily weighed. In foundries, a workman with a bin platform moves from one storage bin to another, loading on the desired quantity of each material to

Yale & Towne Lift Truck Equipped with Scale.

make up a complete batch. Scores of skid loads may be weighed with this truck in approximately the time that would be required to truck a dozen loads 500 ft. to a floor scale and back.

The truck shown in the illustration is the Yale Red Streak single stroke truck equipped with a 2500 lb. beam scale. Hydraulic release check, balanced handling, roller latch and ball bearing wheels are some of the features provided in this truck.

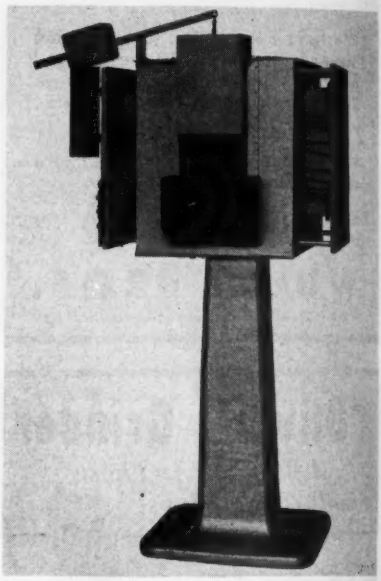
Sentry Size 2 Model Y Electric Furnace

The Model Y Electric Furnace made by The Sentry Company, Foxboro, Mass., and described in the July 1936 issue of MODERN MACHINE SHOP, is now being made in a larger size than the model referred to. Like its smaller predecessor, however, the No. 2 size is a muffle furnace with four heating elements, two above and two below the muffle. Air-cooled terminals are employed which

eliminate water connections, terminals and all electrical contacts being shielded. The heating elements are said to give well over 1000 hours service.

The Size 2 Model Y Furnace will heat from cold to 2350 deg. F in 70 minutes. The current consumption at 2550 deg. F is between 4½ and 9 K. W. depending on the amount of work hardened. The furnace is adequately insulated and the minimum of power is required.

The furnace is designed especially to secure the full advantages of the Sentry



Sentry Size 2 Model Y Electric Furnace

diamond block method of atmospheric control and has a muffle chamber 4½ in. wide, 4 in. high and 11 in. deep. It will accommodate the five standard diamond block sizes. The furnace can be supplied with any standard make of temperature control or connected to suitable control equipment. It is available either with pedestal or for bench mounting and can also be equipped with a gas curtain.

F-3105 Full-Vue Goggle

The American Optical Company, Southbridge, Mass., has announced the addition of the F-3105 Ful-Vue Goggle to the line of eye protection equipment now made by this firm. According to

F-3105 Ful-Vue Goggle.

the manufacturer, this equipment has all the comfort and safety features of the regular Ful-Vue Goggle plus side shields that provide extra protection against particles striking from any direction.

Both the metal frame and the wire mesh screens are non-corrosive. The mesh screens are easily cleaned and the mesh is sufficiently fine to prevent the passage of flying particles, but does not hinder air circulation.

Lufkin Telescoping Gage

To meet the need for a telescoping gage with which inside diameters of less than one inch can be measured. The Lufkin Rule Co., Saginaw, Mich., has brought out the No. 79AA Telescoping Gage shown in the illustration. This gage has a range of from $\frac{5}{16}$ to $\frac{1}{2}$ in. As in the larger gages, the handle on the No. 79AA can always be locked in the center of the plungers. This distinctive Lufkin feature preserves perfect balance when the tool is in use in small openings.

Lufkin No. 79AA Telescoping Gage.

Like the larger Lufkin Telescoping Gages, the gage consists of a knurled handle and two plungers, one telescoping into the other, both under constant spring tension and readily locked by a slight turn of the knurled screw. Several sets of gages including this No 79AA Telescoping Gage are now offered by this company, the most complete of these sets consisting of six gages and covering the entire range from $\frac{5}{16}$ to 6 inches.

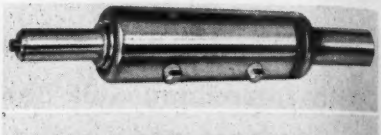
Each set of gages is packed in a case to protect them from injury.

Waukesha Boring Tool Insert

The Waukesha Tool Corporation, Waukesha, Wis., has brought out a line of boring tool inserts which are said to be of an entirely new design and adaptable to all makes of precision boring machines. The feature of the tool is a

patented micrometer, easily adjusted with an Allen key, which enables the machine operator to adjust the cutting point accurately to one-half thousandths of an inch in less than 30 seconds.

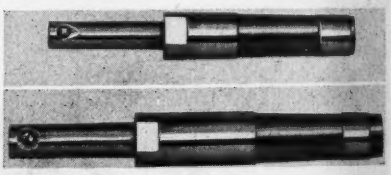
The operation is said to be positive, a simple turn of the key moving the tool



Waukesha Quill Showing Micrometer Graduation Adjustment.

with micrometer accuracy. The action can just as quickly be reversed with the same key. The manufacturer states that, because of the special construction of the insert, it is impossible for the tool to change size while operating at high speed. Boring bars can be furnished with one or more inserts, according to the requirements of the job. The inserts can also be placed at any angle to accommodate the job, either for turning or boring.

The boring tool can be furnished in



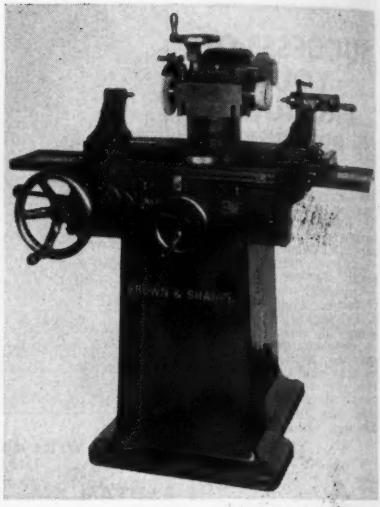
Waukesha Bar Showing Two Carboloy Tips

bar sizes of ½-in. and up, and with cutting tools of Carboloy, tantalum carbide, and diamond points. The inserts are also available in line bars for boring camshaft and crankshaft bearings, for cylinder boring and other boring operations.

B & S No. 10 Cutter and Tool Grinding Machine

The No. 10 Cutter and Tool Grinder illustrated has been designed and built by the Brown & Sharpe Mfg. Co., Providence, R. I., to embody the features

found desirable in its many years of designing, building and operating machines for this purpose. Accommodating all the usual types and sizes of cutters, the machine has the distinct advantage of requiring only one operating position. The low fixed height permits the operator to easily see the grinding wheel in contact with the work when at the



B & S No. 10 Cutter and Tool Grinding Machine

natural operating position in front of the machine. Here in one position all table and wheel controls are within easy reach.

The table and spindle movements are smoothly, easily and accurately made, whether the work is light or heavy. The machine centers swing 10 in. in diameter and take 20 in. in length. Maximum longitudinal table travel is 18 in. by handwheel, and a 4 in. table reciprocation by handlever is available anywhere in the 18 in. travel. Largest diameter that can be ground on centers is 6 inches.

The machine has a heavy single-piece base casting supporting the sliding table and wheel spindle column. The sliding

table, which is traversed by hand at the fast or slow rate of 11/16 in. or 6½ in. per revolution of the handwheel, mounts the swivel table. A graduated arc at the front of this table reads to degrees and a scale at the end reads to 3 in. taper per foot. The centerhead and footstock are clamped to the swivel table and drawn securely into alignment by bolts placed at an angle to the table surface. The centerhead is equipped with a clearance setting gage.

The wheel spindle column has a transverse movement of 7 in., controlled by a handwheel graduated to read to 0.001 in. It swivels 90 deg. either side of the zero line, the scale reading to degrees. Spring shoes maintain column alignment and a vertical setting clamp is provided. The 5½ in. vertical adjustment is controlled by a handwheel graduated to 0.001 in. A constant speed, dust proof motor drives the cartridge type spindle by V-belt. Spring shoes automatically maintain adjustment of the wheel spindle boxes. Two wheel speeds are provided; 3760 and 4380 r. p. m. A very complete group of accessories is furnished including a universal head, cutter bars, tooth rests, wheel sleeves, and so on.

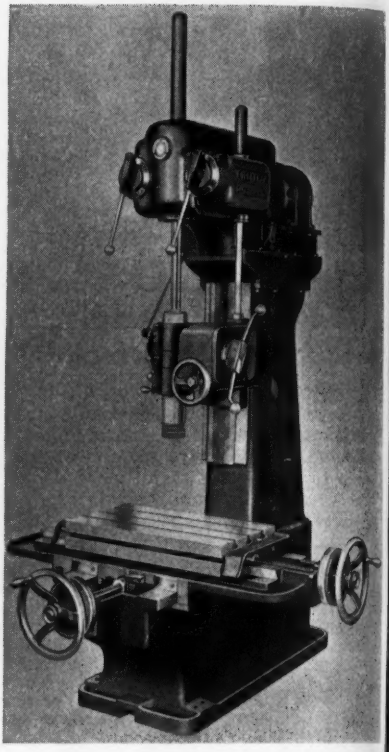
To adapt the machine for economical handling of certain jobs, which come through the shop frequently, numerous attachments are available. Among these are Index Centers, Bushings for Nos. 10, 20 and 30 Milling Machine Standard taper shanks, No. 1 Adjustable Vise, and Taper Holding and Face Mill Grinding Attachments.

Cleereman Tool Room Layout Machine

The Cleereman Machine Tool Company, Green Bay, Wis., has developed a machine to fill the large gap between the ordinary drilling machine equipped with compound table and the high priced jig borer with accuracy spoken of in "tenths." This machine has an accuracy of table travel in either direction within 0.001 in. It will handle all tool, die, jig and fixture layout work where this tolerance is permissible. It will also prove invaluable on experimental and on short run production work where expensive jigs, fixtures and special tooling are not warranted and where closer tolerances are not necessary. The direct reading dials which are mounted on the screws are 8-in. diameter and are graduated to 0.001 in. Due to the large diameter, these graduations are approximately

7/64 in. apart which facilitates quick, accurate reading. Scales graduated in sixteenths for both the longitudinal and latitudinal travel are conveniently mounted on the ways to keep a simple quick check on the measurements. Carefully cut steel lead screws mounted in heavily preloaded ball bearings are furnished for the table movements. This machine can be furnished with any of three types of measuring instruments described below.

Arrangement No. 1 consists of precision hardened and ground tool steel lead screws (machine illustrated, screw guards removed) which are guaranteed by the manufacturer to be accurate within a



Cleereman Tool Room Layout Machine

tolerance of 0.001 in. in two feet. These screws are substituted for the cut screws and with the large dials provide the quickest and most direct method of measurement.

Arrangement No. 2 consists of precision

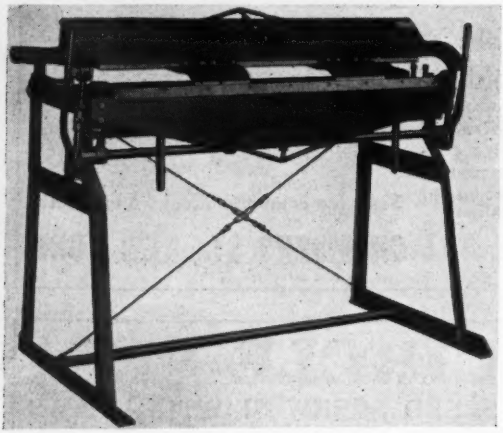
and measuring instruments including built-in dial indicators graduated to 0.0001 in., 1-in. inside micrometers reading to 0.0001 in. and precision and measuring rods in the following lengths: 1, 2, 3, 6 and 12 in. for each direction of table travel. With this precision end measuring equipment, it is said that measurements on the Cleereman Tool Room Layout Machine positively will be as accurate as on any other machine so equipped.

Arrangement No. 3 includes both of the above measuring devices. The hardened and ground lead screws will prove adequate for most layout jobs where tolerances are not too exacting and with the large graduated dials will save considerable time over the end measuring device. However, the precision end measuring arrangement will be available when extremely close tolerances are required in the measurements.

The Cleereman Tool Room Layout Machine is being placed on the market through Cleereman's General Distributors, Bryant Machinery & Engineering Company, 400 W. Madison St., Chicago, Ill., and the latter's local agents.

Whitney Portable Combination Bending Brake

The "Air Conditioning Special" portable bending brake, which was announced by the Whitney Metal Tool Co., Rockford, Ill., recently, has now been brought out in a new model of this same machine, having the same capacity and embodying the same features, but with the addition of fingers for box and pan bending, thus providing sheet metal workers with a portable combination brake which can be easily carried out on the job. This machine will add materially to the speed of fabrication of ducts and other sheet metal work used in air conditioning systems, warm air heating installations, and the like.



Whitney "Air Conditioning Combination Special"

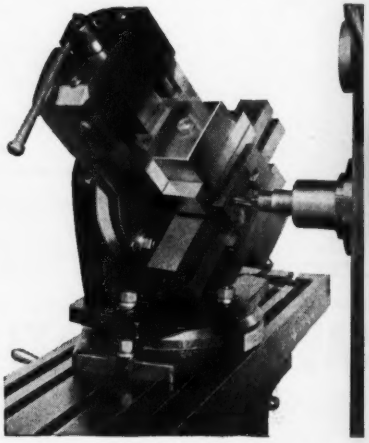
The construction of the "Air Conditioning Combination Special" is much the same as the plain bending model, except for changes in the arms supporting the upper jaw. These arms now have two alternative fulcrum points, so that the jaw can be raised and shifted back to accommodate the box fingers which are attached to the front edge. Set screws on the support members can be adjusted for the gauge of metal being used. There are also two alternative connections for the adjustable toggle links which actuate the upper jaw, and two sets of return springs, one for plain bending and the other for box bending. These springs lift the upper jaw out of the way automatically when the bend is completed. The machine is made for bench or floor mounting, as the illustration shows, the lower part of the angle iron support frame being unbolted for bench mounting. Box and pan fingers of various widths are furnished, and can be clamped anywhere on the front edge of the upper jaw.

Odin Universal Clamping Device

Work can be clamped at any angle or degree by the use of the Odin Universal Clamping Device shown in the illustra-

tion. This machine accessory, a product of Odin Universal Corporation, 110 S. Dearborn St., Chicago, Ill., is designed to eliminate the difficulties that are experienced in clamping odd-shaped workpieces. Many operations that previously required two or more setups can be handled in one with this device, eliminating extra work, extra handling, and insuring greater accuracy in machining.

The device can be used in either vertical or horizontal position and can be so adjusted as to locate the work-piece in either of two planes. The device is built with hardened and ground parallels, giving the operator definite locating points for his work. The jaws are inter-



Odin Universal Clamping Device

changeable, making it possible to use jaws especially designed to fit different classes of work. The device can be used fully assembled or in part thus making it adaptable for tool room work or production work and for the use of any type or kind of special fixtures best adapted for the work at hand. Three sets of jaws—pull down, swivel and plain—are supplied with each vise.

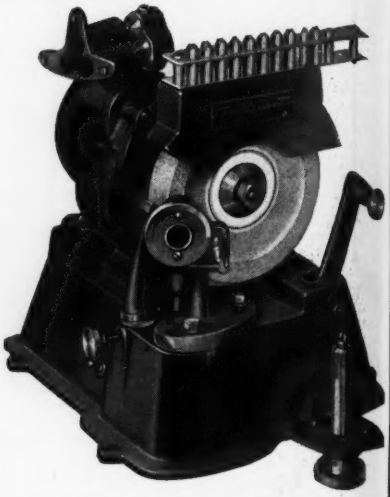
Black Diamond Precision Drill Grinder

The drill grinding machine with which small drills can be ground accurately has been brought out by Black Diamond Saw & Machine Works, Inc., 45 North Ave., Natick, Mass. According to the manufacturer, the Black Diamond Precision Drill Grinder grinds small wire gauge and fractional size drills accu-

rately, holds the drill in a fixed position while making a complete revolution, and grinds the lips to exactly the same length, giving the drill the proper angle and clearance to assure easy cutting. It is also said that this precision grinding can be accomplished on any size drill from No. 60 wire gauge to ½ in. without complicated adjustments.

No adjusting is required on the machine, regardless of the size of the drill being ground. The wheel, a dry cutting cup type wheel of the correct grain and grade for this work, is dressed by the use of a non-adjustable diamond set in a swinging fixture which positions the diamond to dress the wheel correctly for the point of the drill.

To grind a drill, the drill is slipped into the proper size bushing which is then inserted into the collet and set to position in a locator. The drill holder is placed in the grinding fixture and revolved, bringing the cams together and the drill into contact with the grinding wheel.



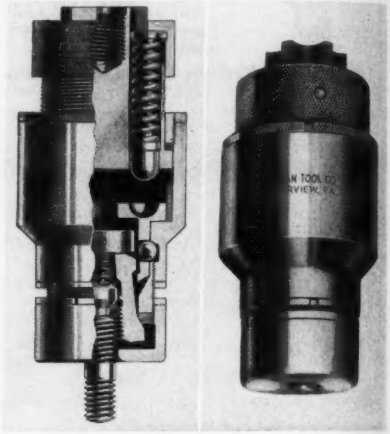
Black Diamond Precision Drill Grinder

The machine is made in two sizes, the No. 1 to handle drills from No. 60 wire gauge to 11/32 in. and the No. 2 to handle drills from ⅛ to ½ in. A special locator for drills from Nos. 60 to 70 can be supplied upon request. The wheel is a 7-in. cup wheel with thin flange for thinning the web. Power is supplied by a fully enclosed ¼ h.p., 110 or 220 volt

A.C. ball bearing motor, or 115 or 230 volt D.C. 3450 r. p. m. motor. Cord and plug with built-in switch in base are standard equipment. Bench space required, 15x12 in. A pedestal can be supplied upon request. Weight, boxed for shipment, 90 pounds.

Titan Controlled Drive Stud Setter

A controlled drive stud setter that is full automatic in loading and releasing, to be known as the Titan Stud Setter, has been brought out by Titan Tool Company, Fairview, Pa. The stud setter is a power driven unit adaptable to all types of drill presses, air or electric tools, both portable and stationary. It operates at both high and low speeds, and is positive in driving and automatic in releasing, thus making it possible to set the studs to any predetermined degree of tightness.



Titan Controlled Drive Stud Setter. At the left the stud setter is shown in open position. Note main clutch disengaged and drive on jaws released.

A distinct feature of the tool is embodied in the safety clutch which controls the driving power of the stud setter. When the studs are driven to the specified tightness, the drive is automatically released and the tool may be removed from the stud without fear of mutilating or distorting the threads. A large knurled adjustment nut is provided for setting up increased driving power in the tool, thus controlling the

tightness of the stud fit. The stud setter jaws are held in open position by a spring plunger, this arrangement insuring a 100 per cent register with the threads on the studs.

A further advantage of the tool is said to consist in the quick and easy manner in which the stud driving jaws are changed or replaced in the tool body. By collapsing the spring plunger and swinging the jaws together, while in the open position, one set of jaws may easily be removed and replaced by another.

The tool is designed to set practically any type of stud and is said to be very successful in setting studs of extremely short lengths. The tool is made in two sizes; the No. 1, which has maximum capacity of ¾ in. and weighs 9 lbs., and the No. 0, which has maximum capacity of 7/16 in. and weighs 3½ pounds.

Drill Gage Free

A drill gage scientifically designed to aid the mechanic or drill maintenance man to grind twist drills correctly is now being offered by the National Twist Drill & Tool Co., Detroit, Michigan, to any reader of this magazine who requests one. By holding the drill parallel to the side of the gage and grinding the drill to the angle which corresponds with the angle presented at the end of the gage, the drill will be correctly ground. One end of the gage gives the angle best suited for drilling on ordinary general purpose steels; the other end provides the correct angle for drills to be used in drilling in alloy steels. Each end is graduated in sixty-fourths of an inch. The gage is of stainless steel and consequently will last indefinitely.

National Twist Drill Co. offers this drill gage free to readers of this magazine.

"BELOW THE HOOK NECESSITIES." The necessities referred to in this six-page folder are material handling devices of special design, tote box grabs, portable platforms, drop bottom buckets, special grabs for various purposes, combination storage bin, bottom dump, hopper and scale, motor operated roll grabs, magnets, and other material handling devices made by Cleveland Tramrail, Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio. Copy free upon request.

OPERATOR'S INSTRUCTION BOOK COVERING LANDIS HEAT-TREATED DIE HEADS. The Landis Machine Company, Waynesboro, Pa., is now issuing a booklet giving instructions for the use of Landis Heat-Treated Die Heads. The booklet is divided into five sections as follows: Chapter I, Grinding Landis Chasers; Chapter II, Setting Landis Chasers; Chapter III, Operation of Landis Die Heads; Chapter IV, Left Hand Threads, and Chapter V, Cleaning and Repairing Landis Heads. Photographs and diagrams are used to illustrate the text, and the last section of the booklet is devoted to pictures of Landis Die Heads, Landis Threading Machines, Landis Collapsible Taps, and Landis Pipe Threading and Cutting Machines. Copy free upon request to any mechanical executive.

"LO-HED ELECTRIC HOIST. This 16-page book, issued by American Engineering Company, 2435 Aramingo Ave., Philadelphia, Pa., describes and illustrates in detail the Lo-Hed electric hoist that is made by this firm. The feature of this hoist is the fact that it is so designed that it can be operated in a minimum of headroom. Drawings show the application of the hoist to stationary beams, plain floor operated trolleys, hand gear trolleys, and motor trolleys. Tables give specifications of the hoist and dimensions for application. Copy free upon request.

Please mention MODERN MACHINE SHOP when enquiring about machines, tools, or equipment advertised in this magazine.

CHICAGO PNEUMATIC TOOL COMPANY BULLETIN 759, issued by Chicago Pneumatic Tool Company, 6 East 44th Street, New York, N. Y., consisting of 12 pages in color, presents the Two-Stage Air-Cooled Motor Driven and Belt Driven Compressors made by this firm. The bulletin is profusely illustrated with photographs of the equipment in action, cross section drawings, and photographs illustrating the features of design, and pictures of various parts of the compressors. Copy free upon request.

L. A. SHAFTLESS MOTORS. The Louis Allis Company, Milwaukee, Wis. has issued an attractive eight-page bulletin describing the many advantages and economics of shaftless motors for driving modern production machinery. The text includes descriptions and illustrations of the various types of shaftless motors, with their construction and electrical characteristics. It also contains valuable tables and engineering data of interest to every manufacturer and user of motorized production machinery. Copies of the bulletin will be sent free upon request.

AMERICAN FLEXIBLE COUPLINGS, made by the American Flexible Coupling Co., Erie, Pa., are illustrated and described in a 16-page catalog which is now being issued by this firm. The text includes illustrations of the coupling and its various parts, together with drawings which will aid the prospective user in the selection of the proper size of coupling for his use. A number of illustrations of various applications of the coupling are also shown and tables are included giving specifications. Copy free upon request.

CARBOLOY RAPID GRINDING MANUAL GM-36. Carboloy Company, Inc., 2975 Easter Jefferson Ave., Detroit, Mich., have announced the publication of a grinding manual showing the latest technique for the rapid, economical grinding of Carboloy tools.

The technique described is the one announced and demonstrated in several cities in the eastern and mid-western metal working areas this Spring and early Summer. It proved to be of unusual interest to users of carbide tools because of the drastic reduction in carbide tool grinding time made possible by following the recommended procedure. The grinding manual GM-36 describes and illustrates the complete procedure including grinding machine requirements, recommended grinding wheels, how to rough grind on the periphery of straight wheels (a feature heretofore not recommended), how to dress the wheels, a recommended method for rapid, rough-stock removal, and the procedure for using diamond wheels and lapping discs. The manual also show the exact steps to take when grinding Carboloy tools that are chipped, extremely dull, slightly dull, milled and brazed, and the procedure for rapidly changing the shapes of Carboloy tools when desired.

Grinding Manual GM-36 is recommended as a comprehensive, practical instruction booklet for all carbide tool users. Copies free upon request.

INDEX TO ADVERTISEMENTS